Single Aisle
TECHNICAL TRAINING MANUAL
T1+T2 (IAE V2500) (Lvl 2&3)
LANDING GEAR

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LANDING GEAR

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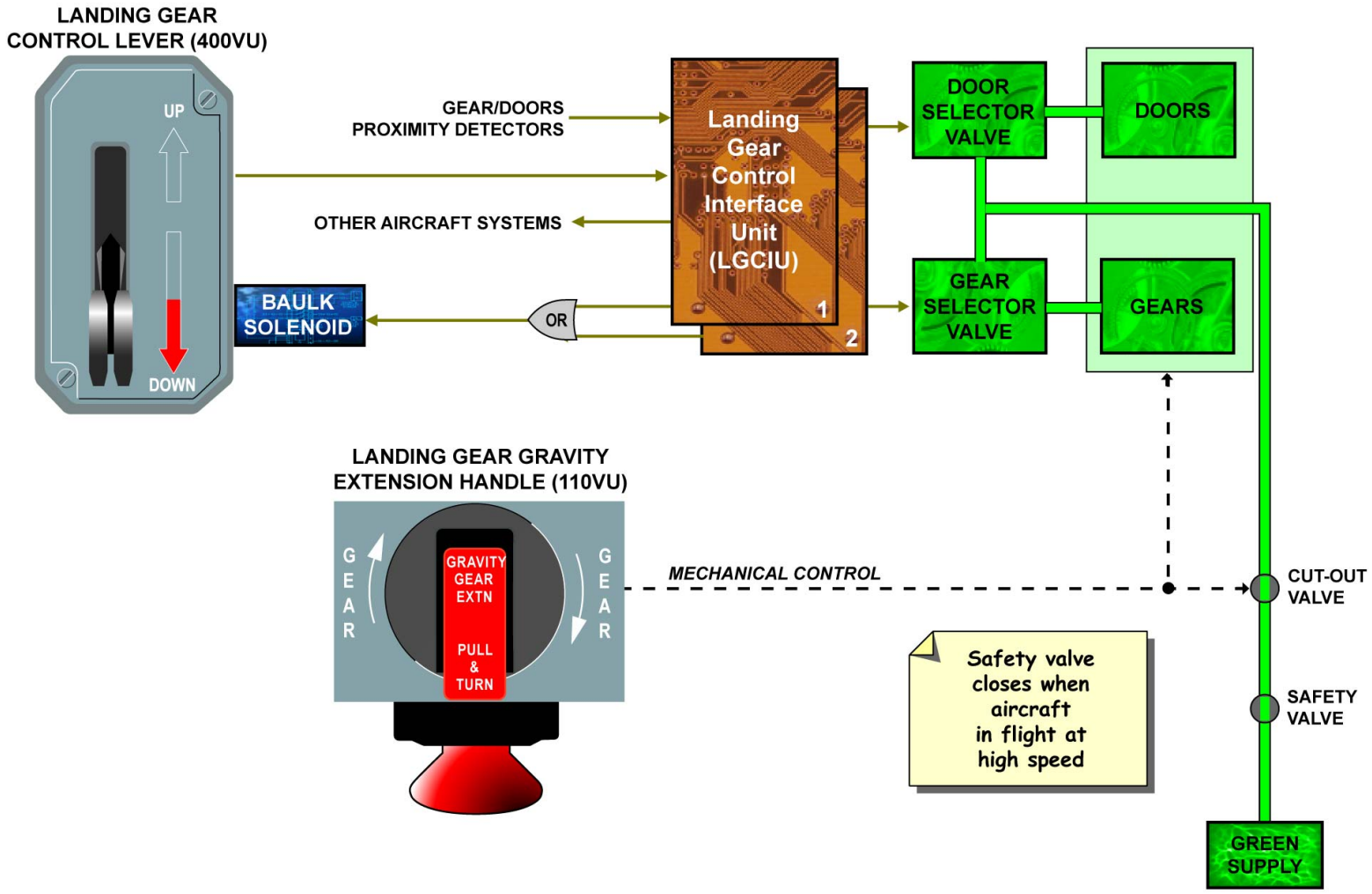
LANDING GEAR SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW

EXTENSION/RETRACTION SYSTEM

Landing Gear Control and Interface Units (LGCIU) 1 and 2 electrically control the gear and door sequencing.
Each LGCIU in turn controls a complete gear cycle: one UP selection and one DOWN selection.
The LGCIU in control is the active unit and the other is the standby unit. The active unit changes after each retract/extend cycle (when the L/G control lever is moved away from the DOWN position). If a failure occurs in the active LGCIU, the standby LGCIU becomes active.
Duplicated sensors monitor the gear up and down positions, the door closed and open positions and the shock absorber compressed (ground signal) and fully extended (flight signal) positions.
An interlock mechanism prevents unsafe retraction by locking the lever in the DOWN position when any shock absorber is compressed.
The two systems are electrically segregated with different connections on the related selector valves.
In case of failure, the gear can be mechanically extended from the cockpit by means of a gravity extension crank handle.
After free fall extension, the L/G doors stay open and the L/G is locked down by the lockstays and springs.
The normal extension and retraction control is available when the free-fall handle-assembly is put back to its initial position.



SYSTEM OVERVIEW - EXTENSION/RETRACTION SYSTEM

LANDING GEAR SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW (continued)

NORMAL BRAKING

Normal braking is obtained when:
- The green hydraulic pressure is available,
- The Anti/SKID and Nose/Wheel Steering control switch is in the ON position,
- The Parking Brake control switch is in the OFF position.

Electrical control is obtained:
- Through the pedals,
- Automatically on the ground by the auto brake system,
- In flight when the gear control lever is set to UP (in flight braking).

ALTERNATE BRAKING

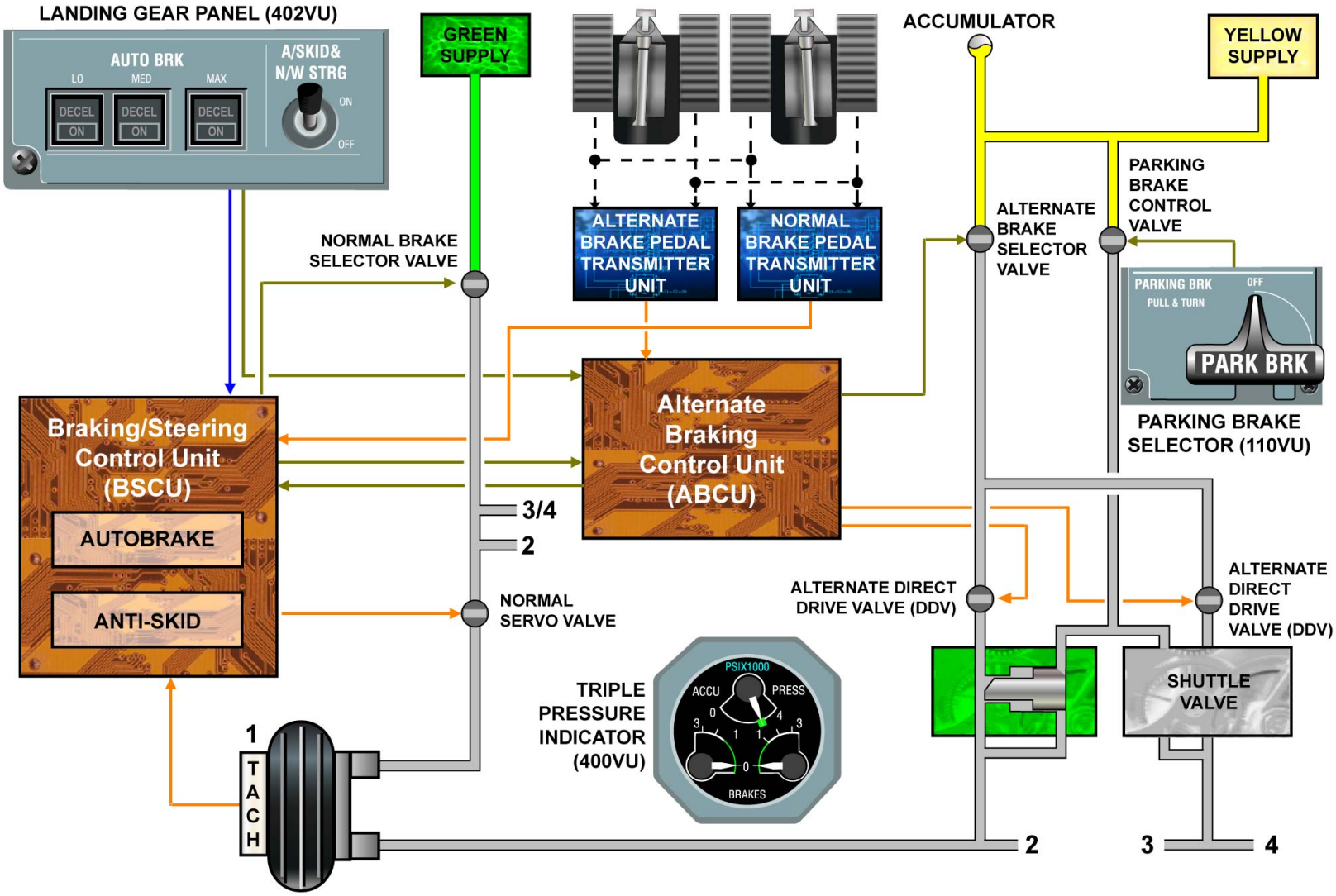
The alternate brake system is energized by the yellow hydraulic system. A brake accumulator can supply hydraulic power for emergencies.
The Alternate Braking Control Unit (ABCU) electrically controls the alternate braking with A/SKID or without A/SKID.
The ABCU becomes active when the normal brake system is defective and/or the green system has a low hydraulic pressure.
The data comes from the BSCU. The brake pedals give braking inputs, which are transmitted through the Alternate Brake Pedal Transmitter Unit to the ABCU. The ABCU will control the braking pressure.
The braking, wheel speed and aircraft speed data are sent to the BSCU to calculate the A/SKID protection.
The braking pressure is read on the triple indicator.

ANTI SKID FUNCTION

The A/SKID function is a part of the BSCU and can be set to OFF with the A/SKID & N/W STeeRinG switch.
BSCU computes the anti skid orders during normal braking. During alternate braking, BSCU computes the anti-skid orders and sends them to the ABCU for execution.
If there is a BSCU failure or low pressure in the green and yellow hydraulic systems, the anti skid function is lost.
The pilot must then refer to the triple pressure indicator to control the brake pressure and to prevent wheel locking.
But the ABCU sets a maximum limit of 1000 PSI for the brake pressure.
If there is a loss of the green and yellow hydraulic systems, braking is still available with the brake accumulator.
With the accumulator pressure only, a maximum of 7 full brake pedal applications can be done.

PARKING BRAKE

The yellow hydraulic system or the brake accumulators supply brake pressure.
Putting ON the parking brake deactivates the other braking modes and the A/SKID system.



SYSTEM OVERVIEW - NORMAL BRAKING ... PARKING BRAKE

LANDING GEAR SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW (continued)

NOSE WHEEL STEERING

The steering system uses the yellow hydraulic system to operate a steering actuating cylinder, which changes the direction of the NLG wheels.

The steering system receives hydraulic pressure in the following conditions:

- A/SKID & N/W STeeRinG switch is in ON position,
- towing control lever is in normal position,
- at least one ENG MASTER switch is ON,
- aircraft is on ground.

The steering system is controlled by the BSCU, which receives order from:

- the steering hand wheels (orders added algebraically),
- the rudder pedals,
- the autopilot.

When the rudder pedal disconnect pushbutton is pressed in, N/WS is disconnected from the pedals.

The BSCU transforms the orders into N/WS angle. That angle has the following limits:

- Ruder pedals: max 6 degrees,
- Hand wheels: max 74 degrees.

The NLG is equipped with Rotary Variable Differential Transducers (RVDTs), which are used as feedback sensors to the BSCU.

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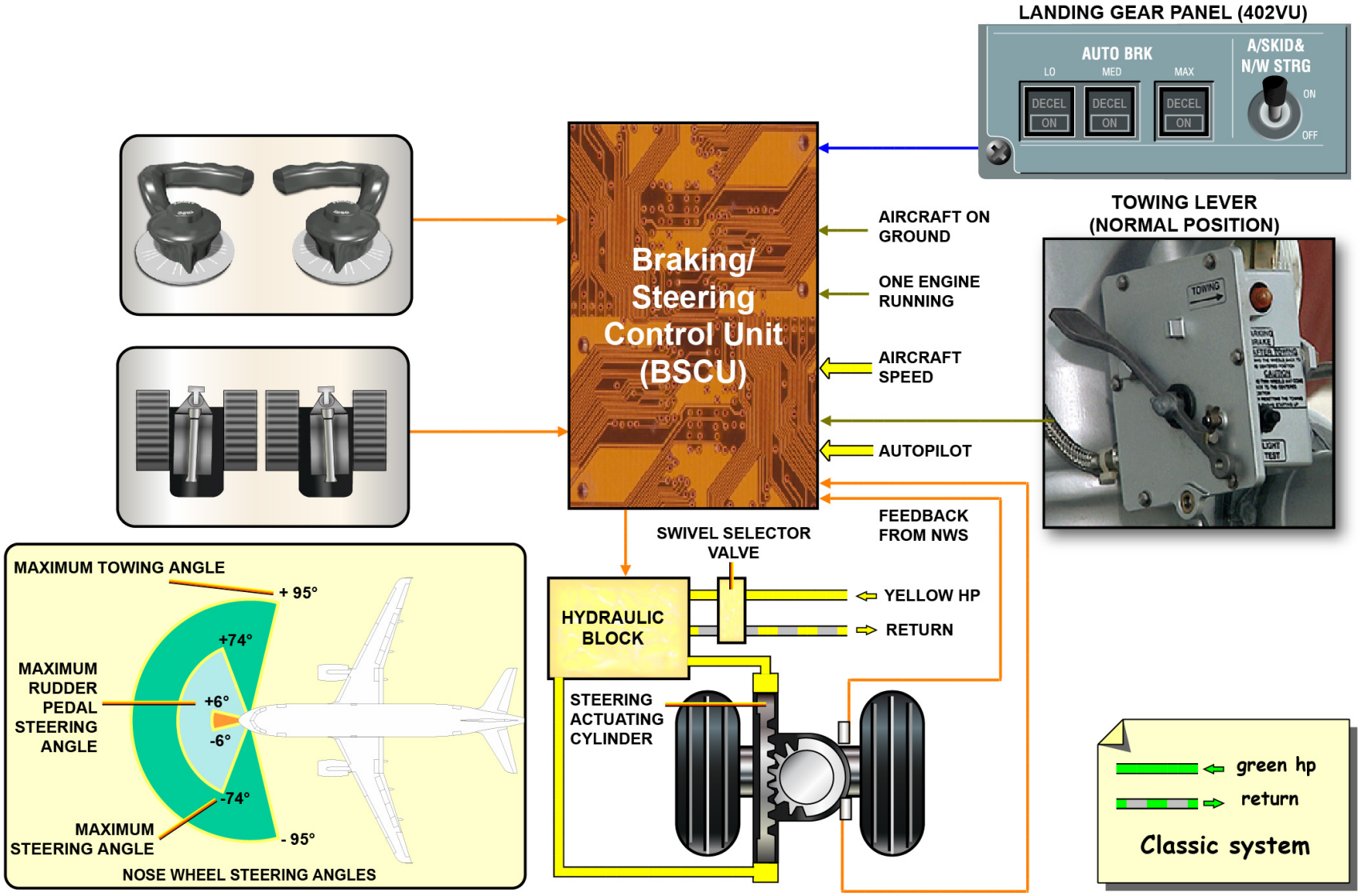


SYSTEM OVERVIEW - NOSE WHEEL STEERING

LANDING GEAR SYSTEM COMPONENT LOCATION (2)

SYSTEM OVERVIEW (continued)

BTMU

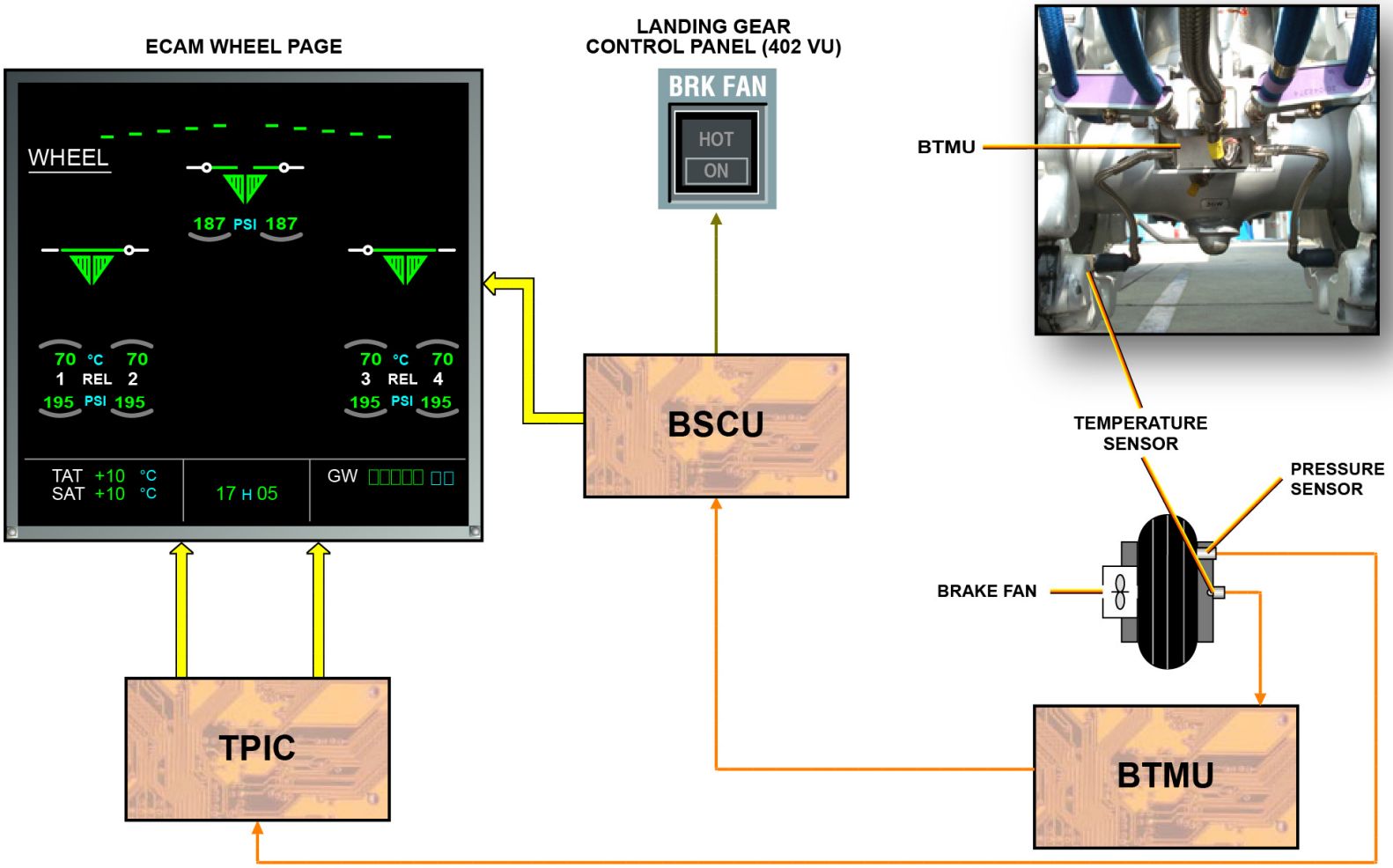
One Brake Temperature Monitoring Unit (BTMU) per gear transmits the brake temperature from the temperature sensors (one per brake) to the BSCU.

FAN

The brake cooling system is a manually controlled system that decreases the temperature of the brakes when they are too hot.
This optional system allows the brakes to be cooled in a short time period.
One brake fan system with one BRK FAN HOT P/BSW is installed.

TPIS

The Tire Pressure Indicating System (TPIS) includes an electronic sensor on each wheel and a Tire Pressure Indicating Computer (TPIC).
The TPIC controls and monitors the operation of the system and sends data to other interfaced systems.
As an MPD item, the tire pressure can be checked through:
- a pressure gage (tool),
- or the ECAM WHEEL page.

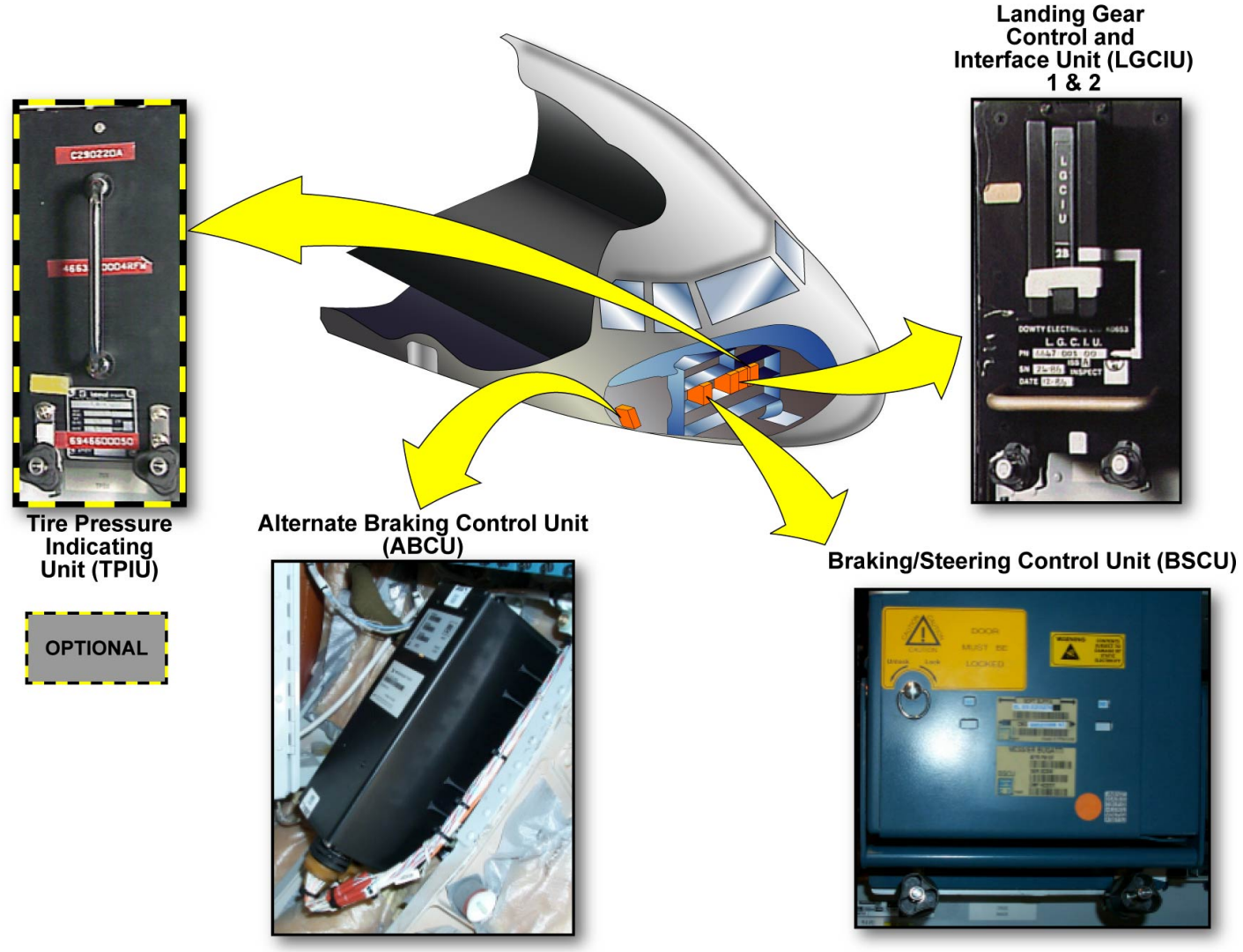


SYSTEM OVERVIEW - BTMU ... TPIS

LANDING GEAR SYSTEM COMPONENT LOCATION (2)

COMPONENT LOCATION

The L/G computers are installed in the forward avionics bay.
Note that the Tire Pressure Indication Unit (TPIU) is an option.


Landing Gear Control and Interface Unit (LGCIU) 1 & 2
Tire Pressure Indicating Unit (TPIU)
OPTIONAL
Alternate Braking Control Unit (ABCU)
Braking/Steering Control Unit (BSCU)

COMPONENT LOCATION

LANDING GEAR SYSTEM CONTROL & INDICATING (2)

LOCATE CONTROL/INDICATING IN COCKPIT

LANDING GEAR CONTROL / INDICATING

BRAKING, BRAKE TEMPERATURE AND TPIS CONTROL / INDICATING

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LANDING GEAR NORMAL OPERATION (3)

EXTENSION

Description of the normal extension phase of the L/G.

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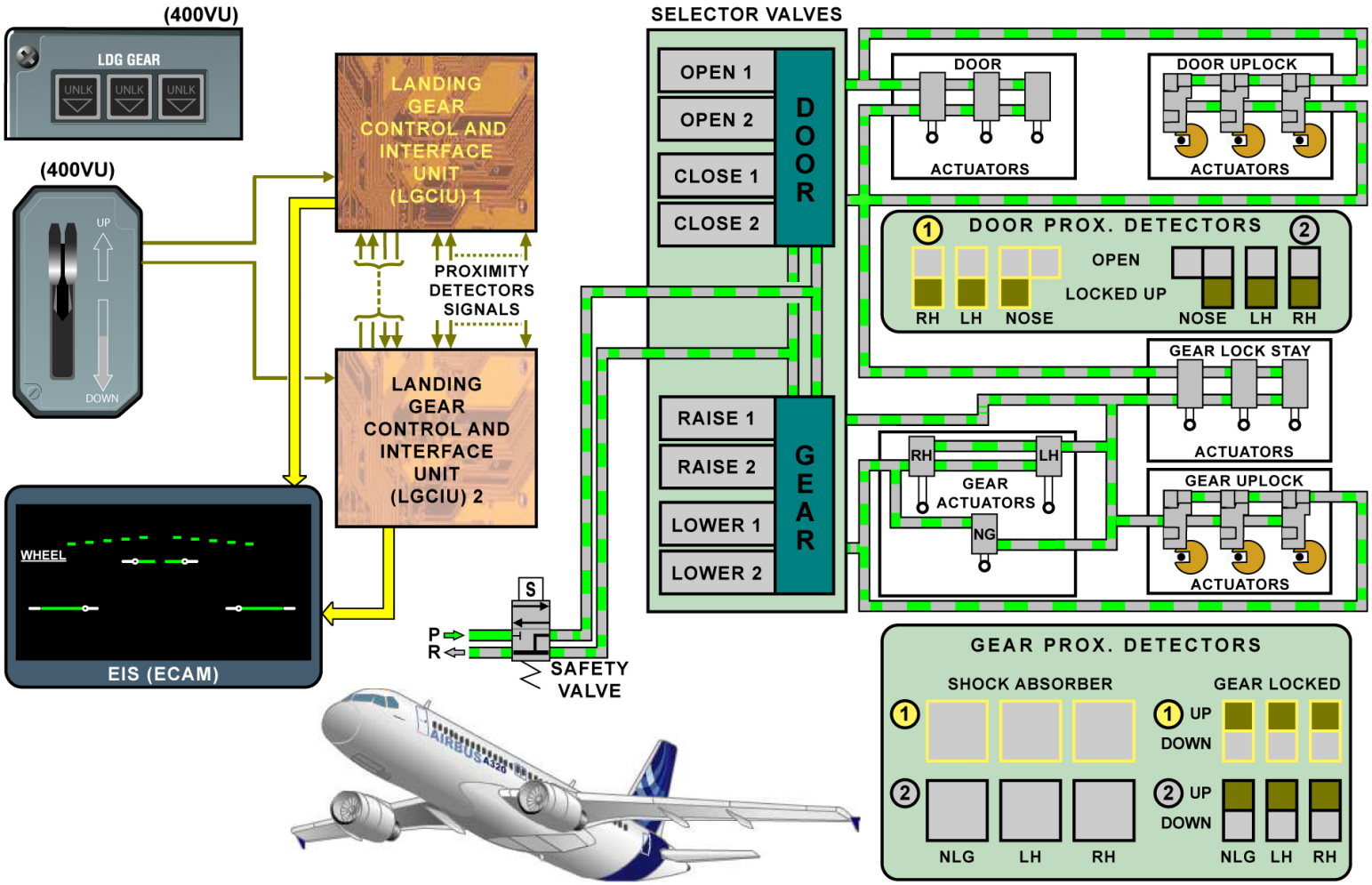
(400VU)
LDG GEAR
UNLK
UNLK
UNLK
(400VU)
UP
DOWN
LANDING GEAR CONTROL AND INTERFACE UNIT (LGCIU) 1
PROXIMITY DETECTORS SIGNALS
LANDING GEAR CONTROL AND INTERFACE UNIT (LGCIU) 2
WHEEL
EIS (ECAM)
S
P
R
SAFETY VALVE
SELECTOR VALVES
OPEN 1
OPEN 2
CLOSE 1
CLOSE 2
DOOR
RAISE 1
RAISE 2
LOWER 1
LOWER 2
GEAR
DOOR
ACTUATORS
DOOR UPLOCK
ACTUATORS
DOOR PROX. DETECTORS
1
2
OPEN
LOCKED UP
RH
LH
NOSE
NOSE
LH
RH
GEAR LOCK STAY
ACTUATORS
RH
LH
GEAR ACTUATORS
NG
GEAR UPLOCK
ACTUATORS
GEAR PROX. DETECTORS
SHOCK ABSORBER
GEAR LOCKED
1
2
1 UP
DOWN
2 UP
DOWN
NLG
LH
RH
NLG
LH
RH

EXTENSION

LANDING GEAR NORMAL OPERATION (3)

EXTENSION (continued)

DOOR OPENING

When DOWN is selected, the Landing Gear Control and Interface Unit (LGCIU) takes control of the extension sequence. The LGCIU signals the doors to open via selector valves and the door proximity detectors signal the "doors fully open position" back to the LGCIU in order to continue the sequence.

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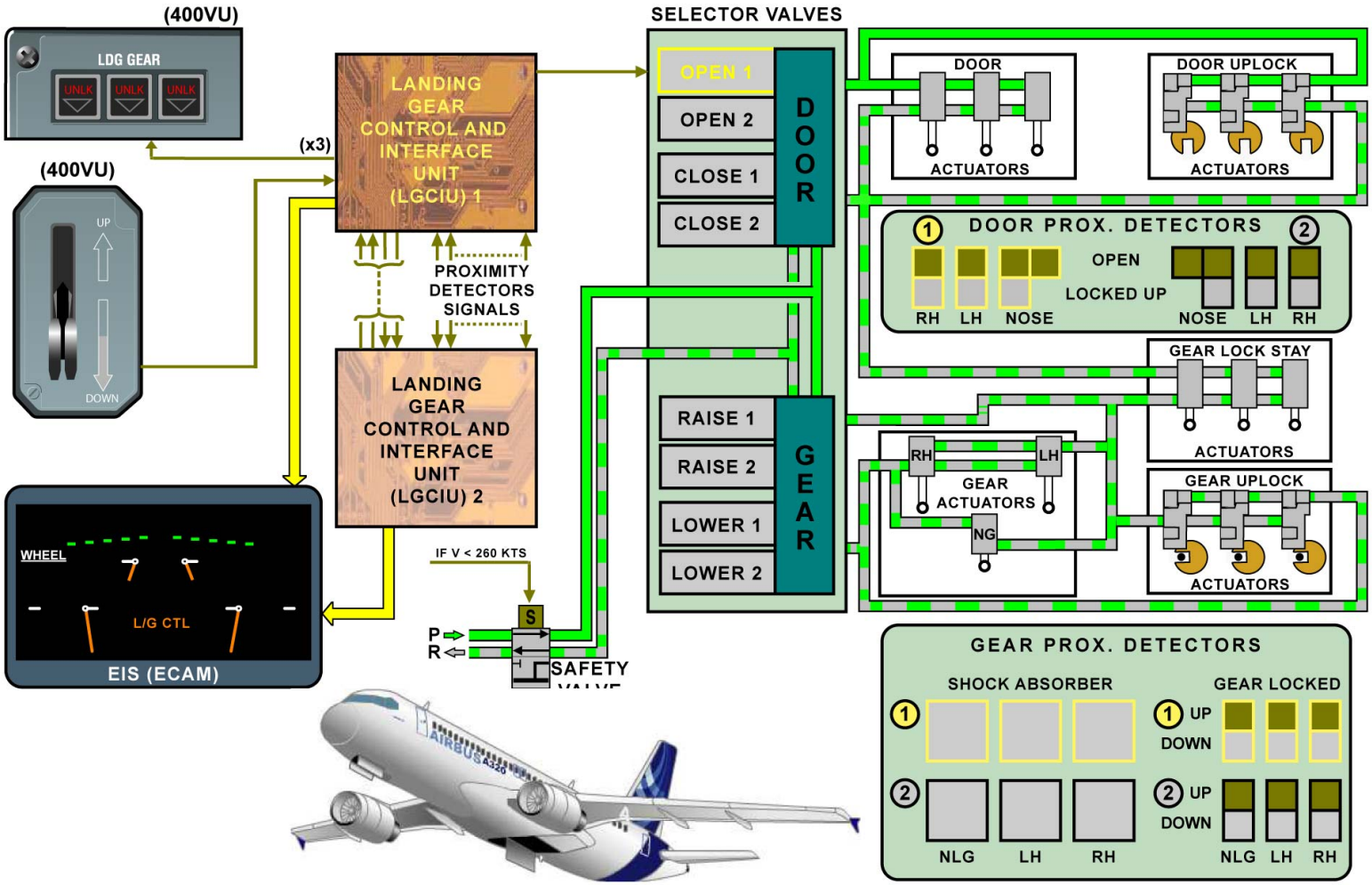

EXTENSION - DOOR OPENING

LANDING GEAR NORMAL OPERATION (3)

EXTENSION (continued)

GEAR DOWN

When all doors are fully open, the LGCIU commands a gear extension while maintaining the "doors open" signal. The gear proximity detectors signal to the LGCIU that the gears are downlocked.

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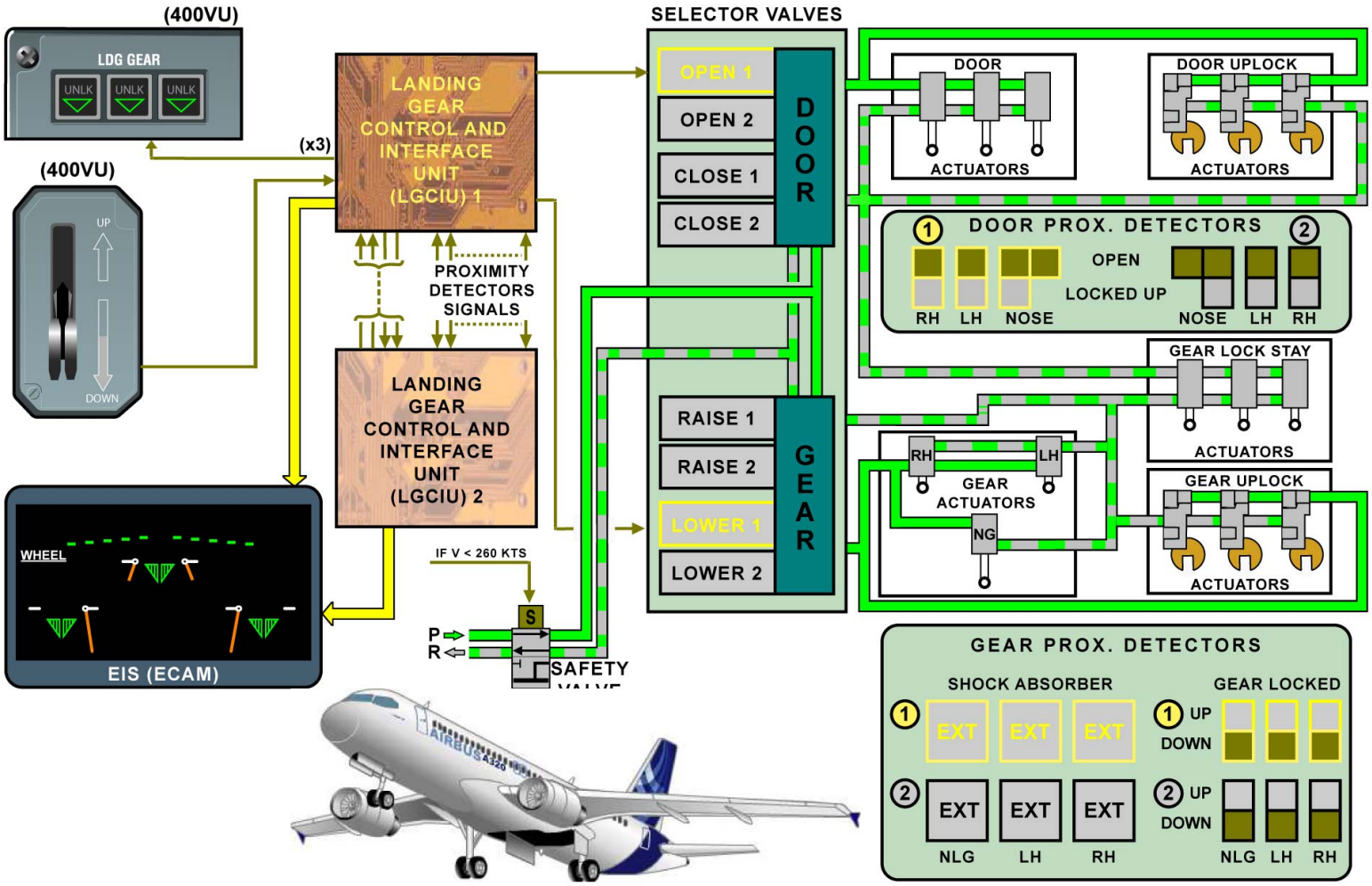

EXTENSION - GEAR DOWN

LANDING GEAR NORMAL OPERATION (3)

EXTENSION (continued)

DOOR CLOSING

When all the gear are down and locked, the LGCIU signals the doors to close and lock stay actuators to pressurize, while maintaining the "gear extended" signal. Door closing hydraulic pressure is fed to the lock stay actuators to back up the downlock springs. Door uplock proximity detectors signal to the LGCIU that the doors are uplocked. As the doors begin to close, the LGCIU cancels the "gear extended" signal while maintaining the "door close" signal.
The extension sequence is completed.

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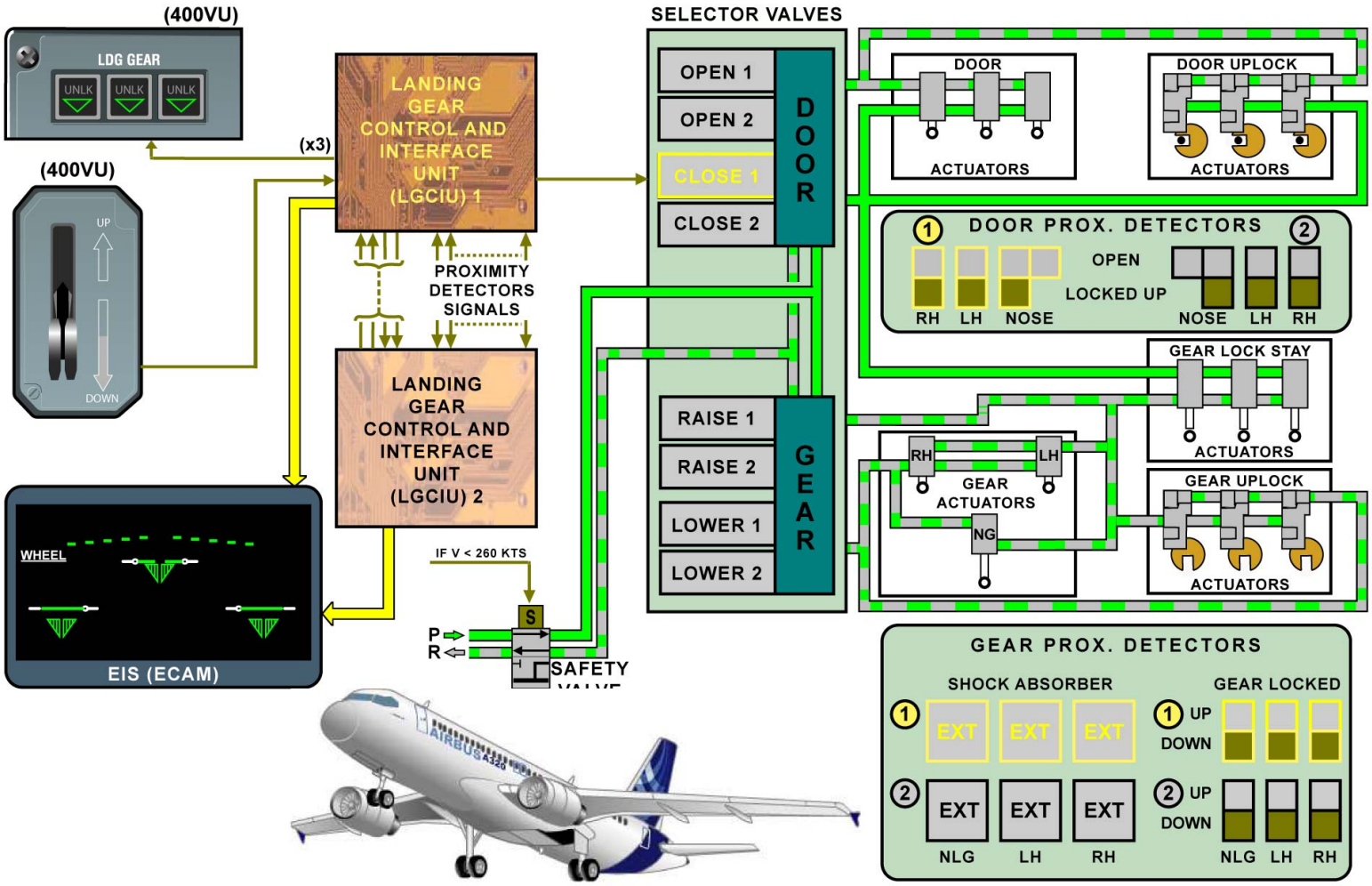

EXTENSION - DOOR CLOSING

LANDING GEAR NORMAL OPERATION (3)

RETRACTION

Setting the L/G control lever to UP causes systems 1 and 2 changeover. This allows the system which was previously in standby to control the next retraction and extension sequence. Each LGCIU controls one complete gear cycle: one UP selection and one DOWN selection.

DOOR OPENING

The LGCIU must detect all three shock absorbers fully extended before allowing the selection of the L/G control lever to UP. The LGCIU signals the doors to open via selector valves and the door proximity detectors signal the doors fully open position back to the LGCIU in order to continue the sequence.

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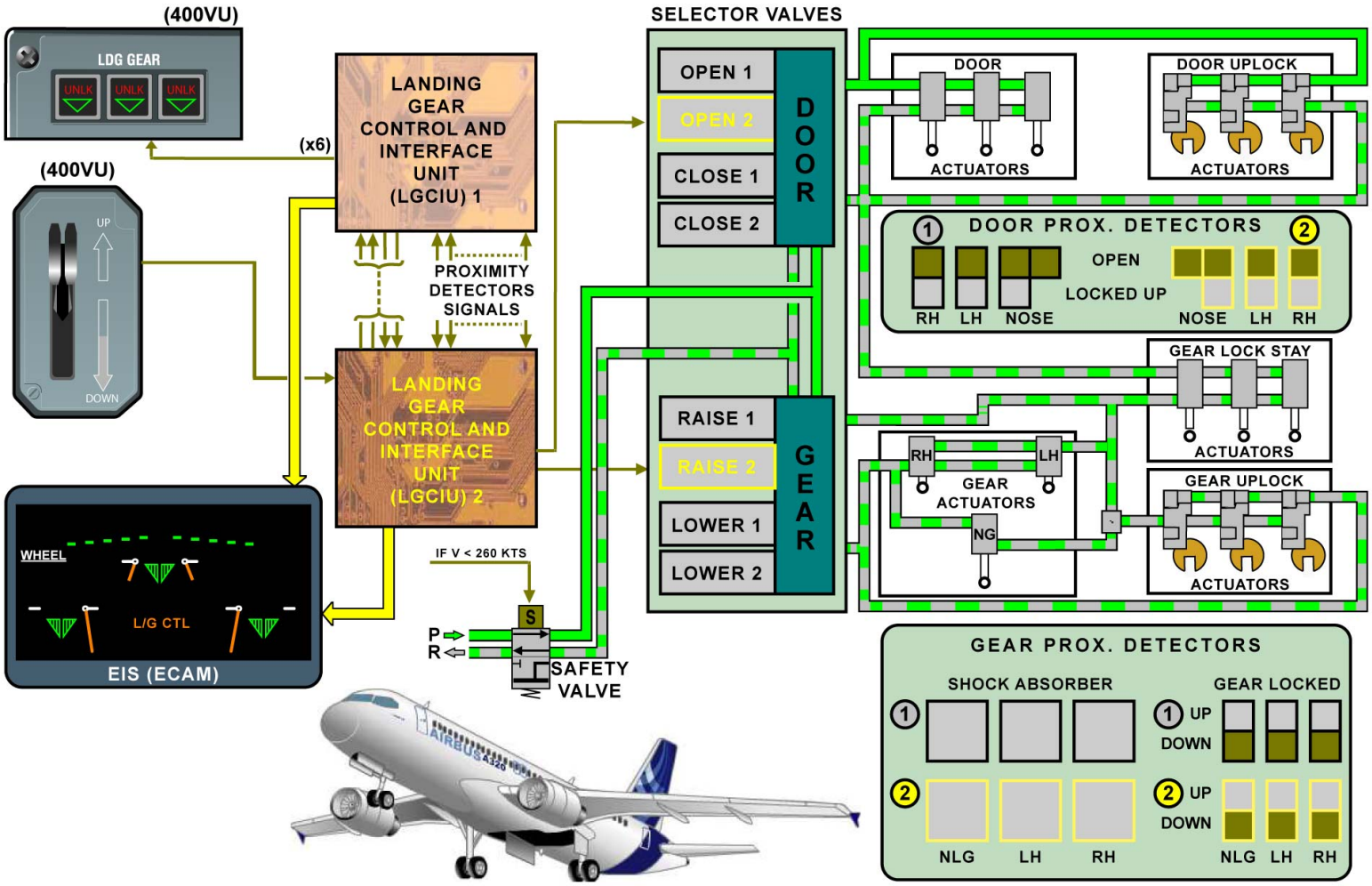

RETRACTION - DOOR OPENING

LANDING GEAR NORMAL OPERATION (3)

RETRACTION (continued)

GEAR UP

When all doors are fully open, the LGCIU signals the L/G to raise while maintaining the "doors open" signal to keep the doors "open" line pressurized. The gear uplock proximity detectors signal the LGCIU that the gear is uplocked.

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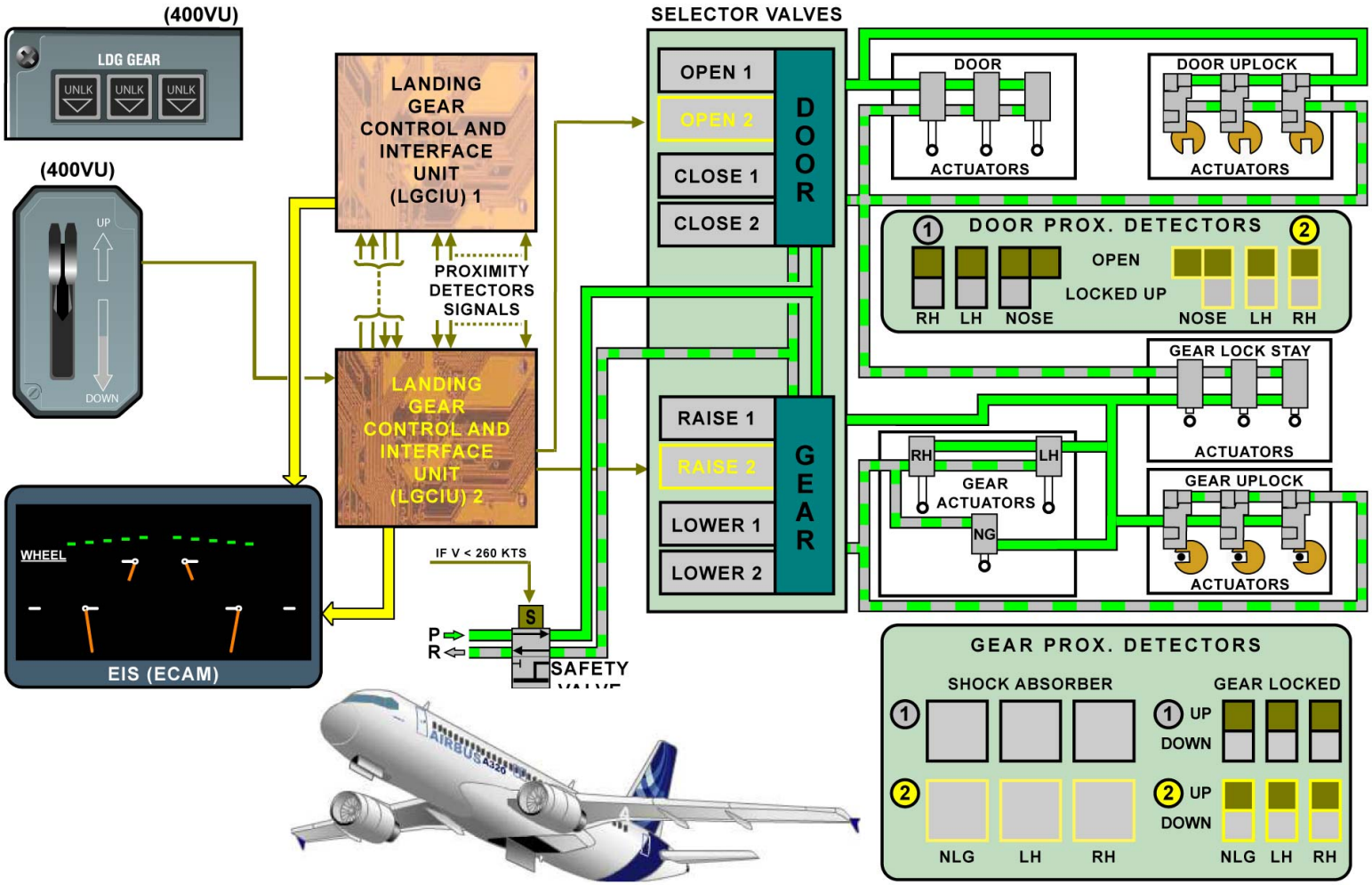

RETRACTION - GEAR UP

LANDING GEAR NORMAL OPERATION (3)

RETRACTION (continued)

DOOR CLOSING

When all the L/G is up and locked, the LGCIU signals the doors to close while maintaining L/G UP signal to keep the "raise" line pressurized. Door uplock proximity detectors signal the LGCIU that the doors are uplocked.

As soon as the last door closes and locks, the LGCIU cancels the "L/G raise" signal and maintains the "door close" signal as long as the safety valve is open.

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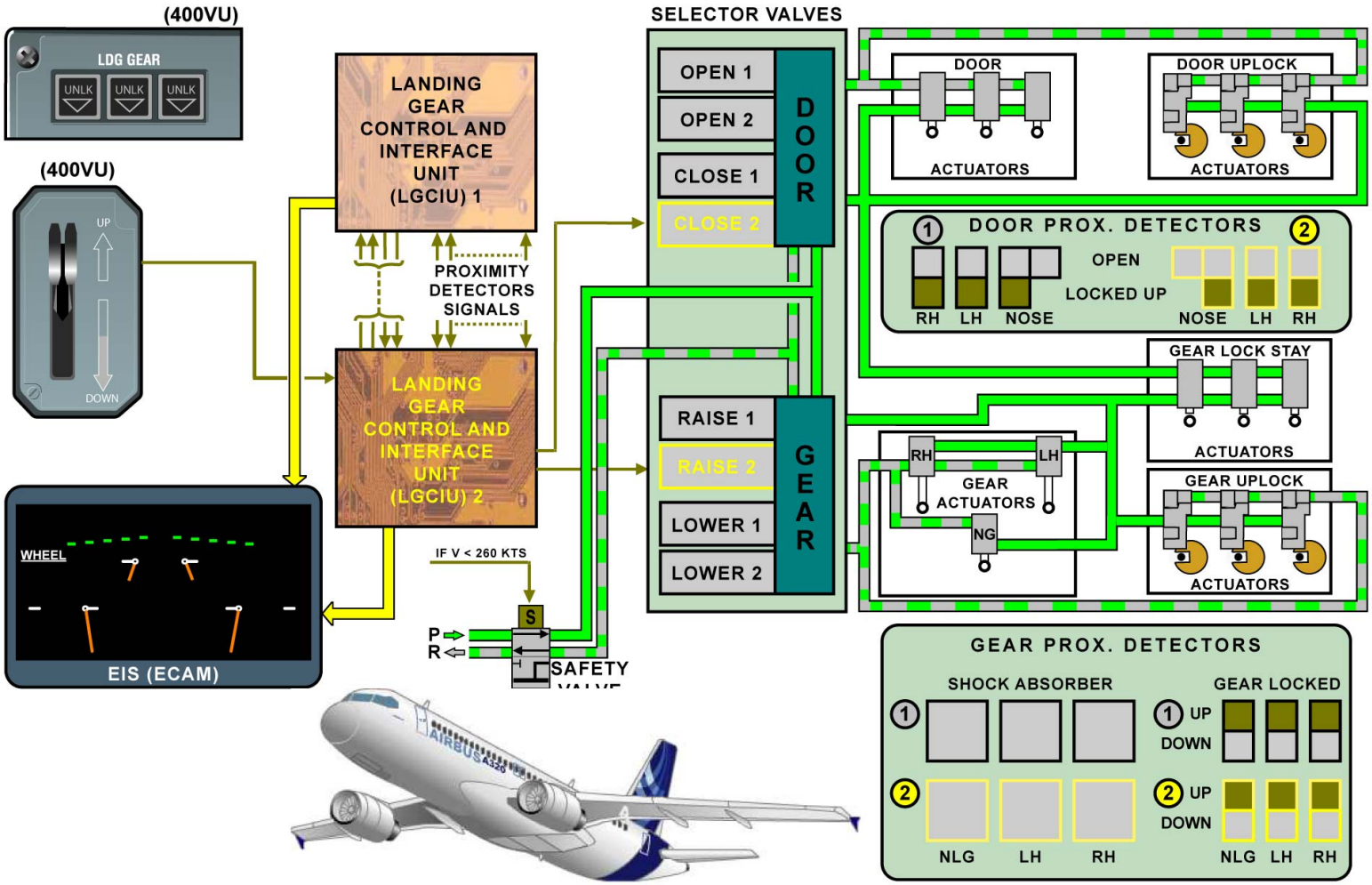
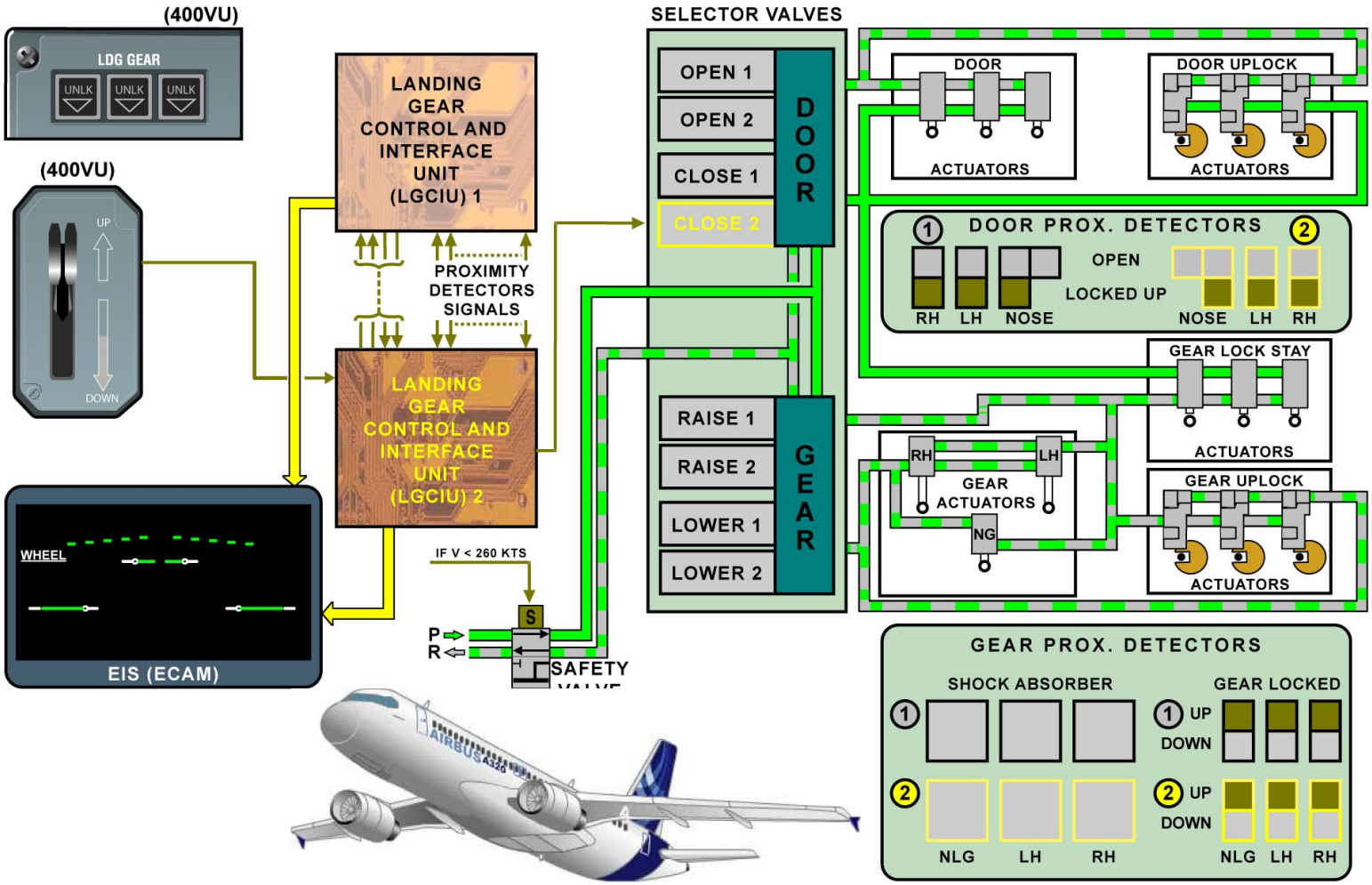


RETRACTION - DOOR CLOSING



RETRACTION - DOOR CLOSING

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LANDING GEAR NORMAL OPERATION (3)

RETRACTION (continued)

HYDRAULIC SHUTOFF

Air Data Inertial Reference Units (ADIRUs) 1 and 3 send a signal to the safety valve to shut off the hydraulic pressure to the L/G system. When the airspeed is greater than 260 ±5 kts the hydraulic circuit to the L/G is depressurized.
The retraction sequence is completed.

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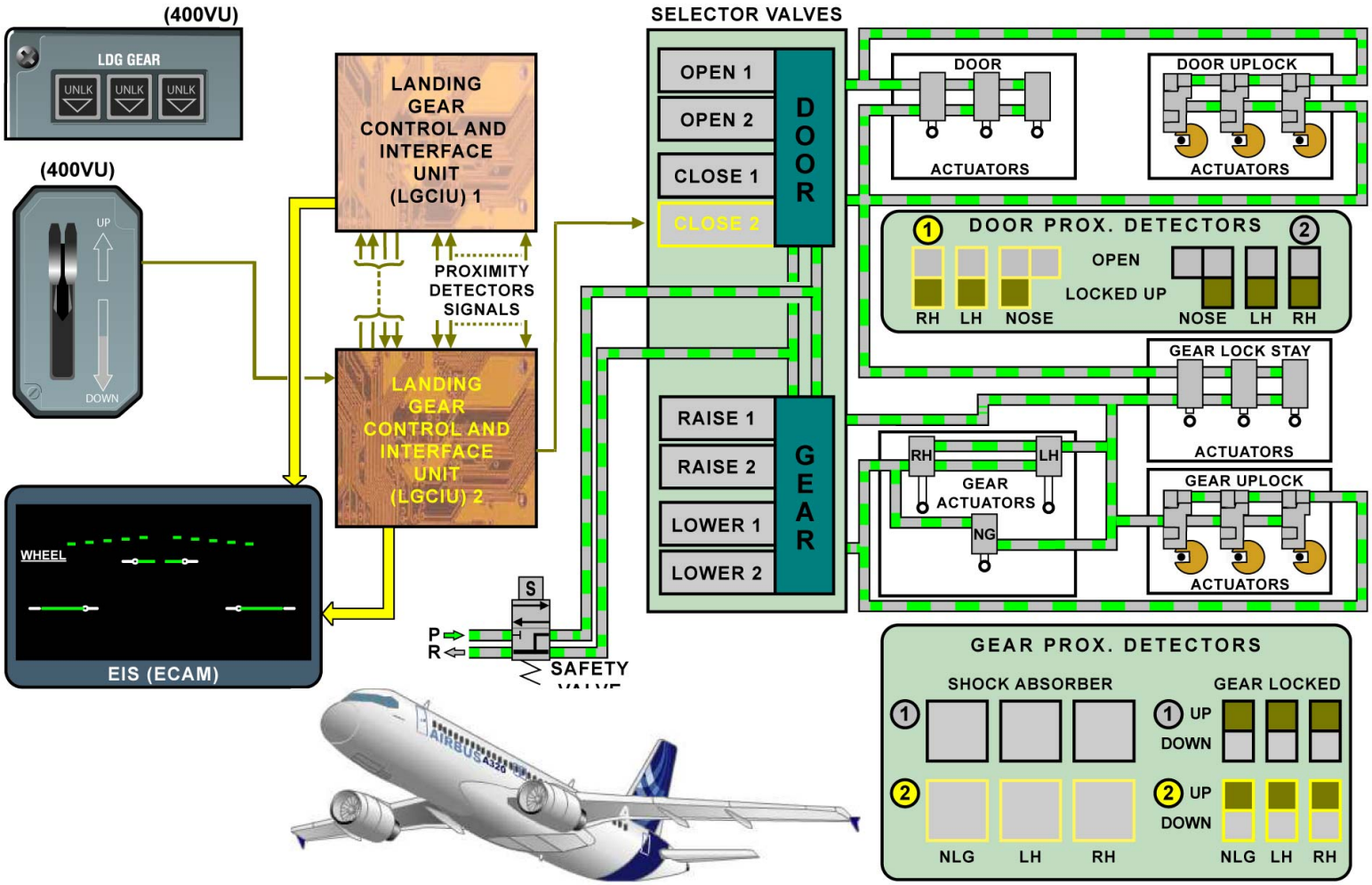


RETRACTION - HYDRAULIC SHUTOFF

LANDING GEAR FREE FALL EXTENSION (3)

GENERAL

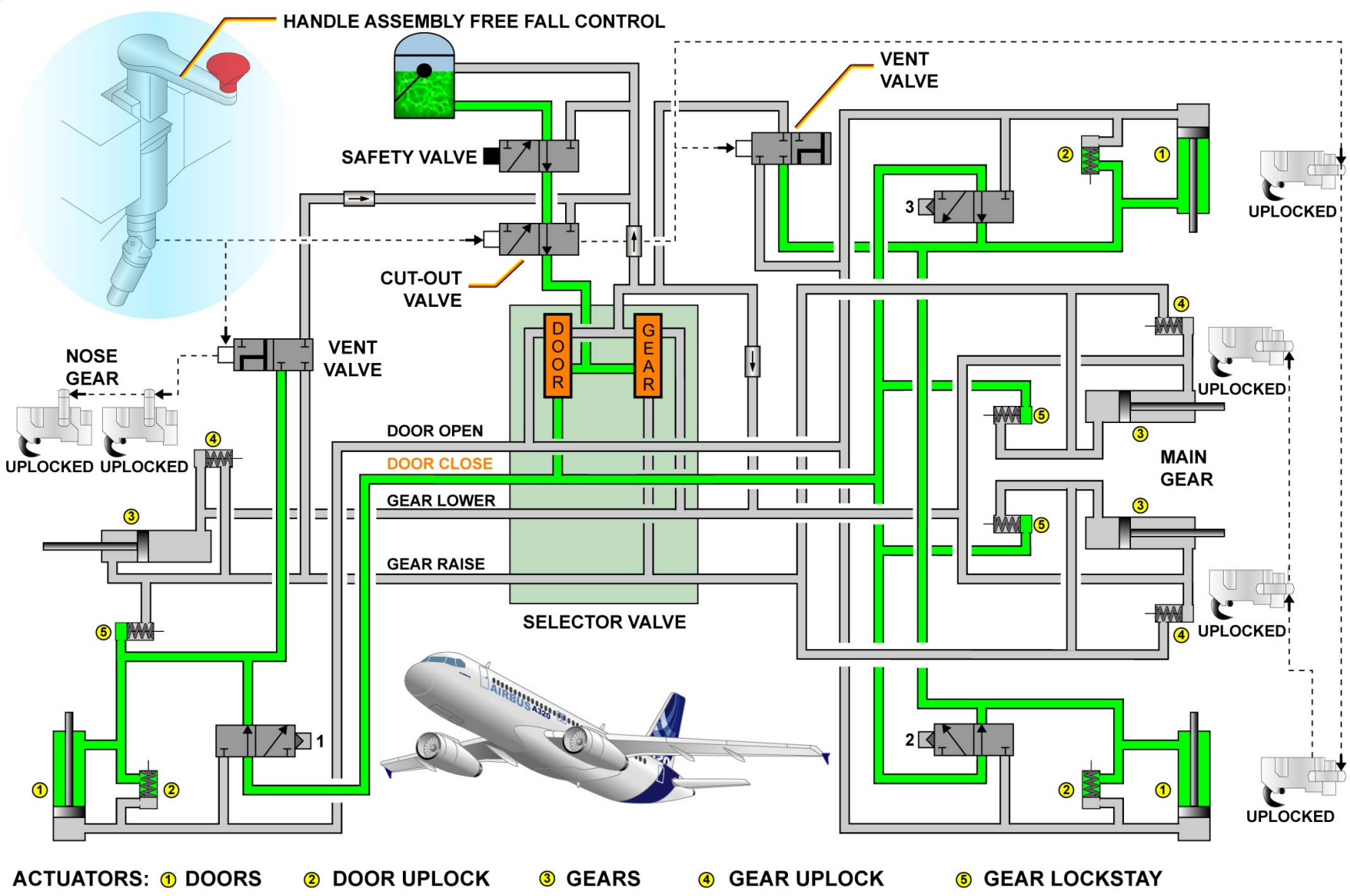
Free fall extension is used either when :
- both Landing Gear Control Interface Units (LGCIUs) have failed,
- there is green hydraulic low pressure,
- one door cannot be opened hydraulically,
- one gear leg cannot be lowered hydraulically.

If both LGCIUs fail the solenoids are not energized and the door "close" lines are not pressurized. If the green hydraulic pressure is low the door "close" lines are not pressurized.

INITIAL CONFIGURATION

The safety valve is open and residual pressure supplies the door "close" line downstream of the selector valve. Gears and doors are uplocked.

NOTE: Note: That the door bypass valves (1, 2 and 3) are only operated during ground maintenance.



GENERAL & INITIAL CONFIGURATION

LANDING GEAR FREE FALL EXTENSION (3)

LEVER MOVEMENT UP TO 1.5 TURNS

Rotating the gravity extension crank handle initially operates the cut-out valve and both vent valves to depressurize the system by connecting the entire L/G hydraulic system to return.

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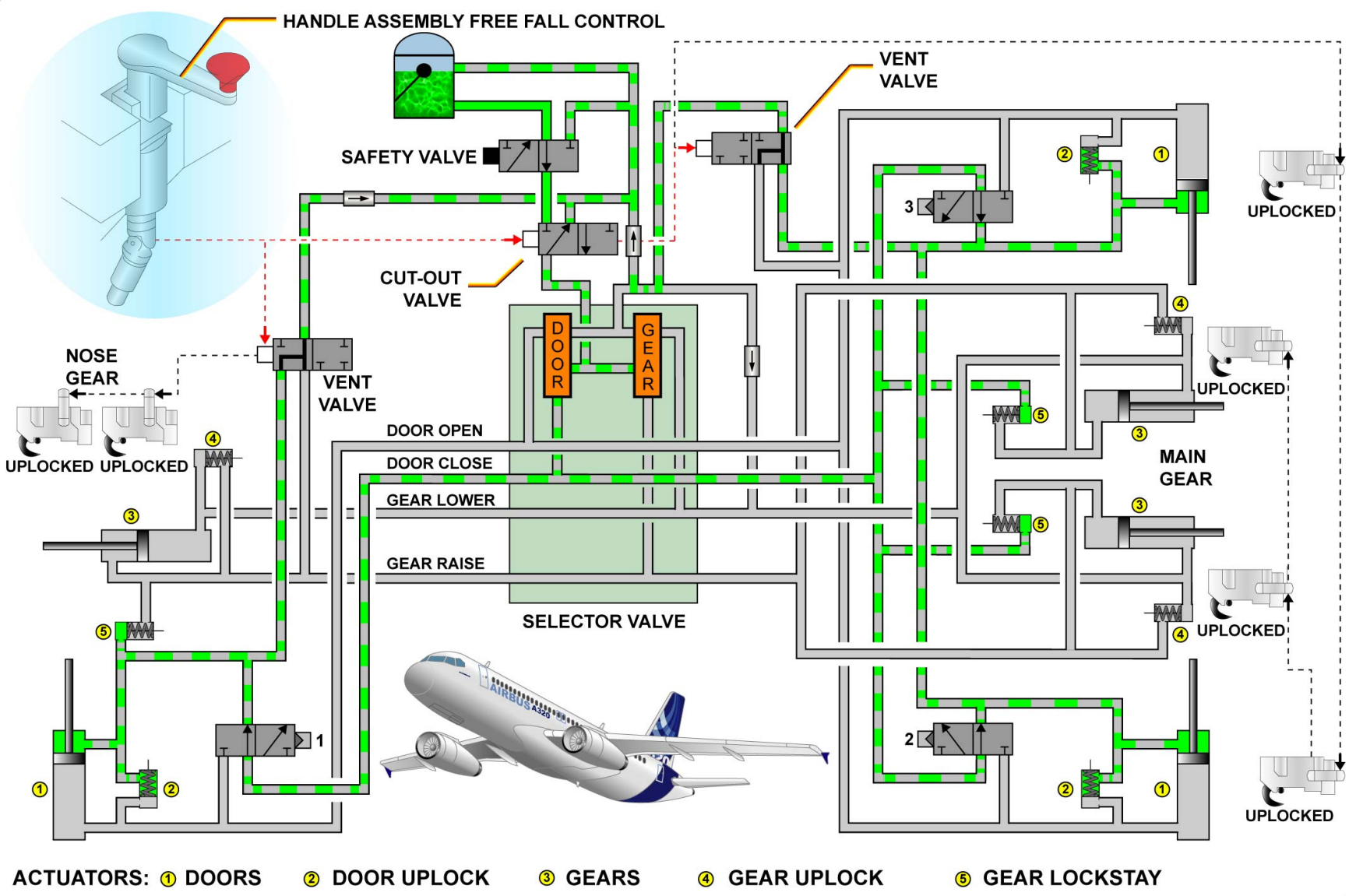

LEVER MOVEMENT UP TO 1.5 TURNS

LANDING GEAR FREE FALL EXTENSION (3)

LEVER MOVEMENT BETWEEN 1.6 AND 1.8 TURNS

Then the doors uplocks are released.

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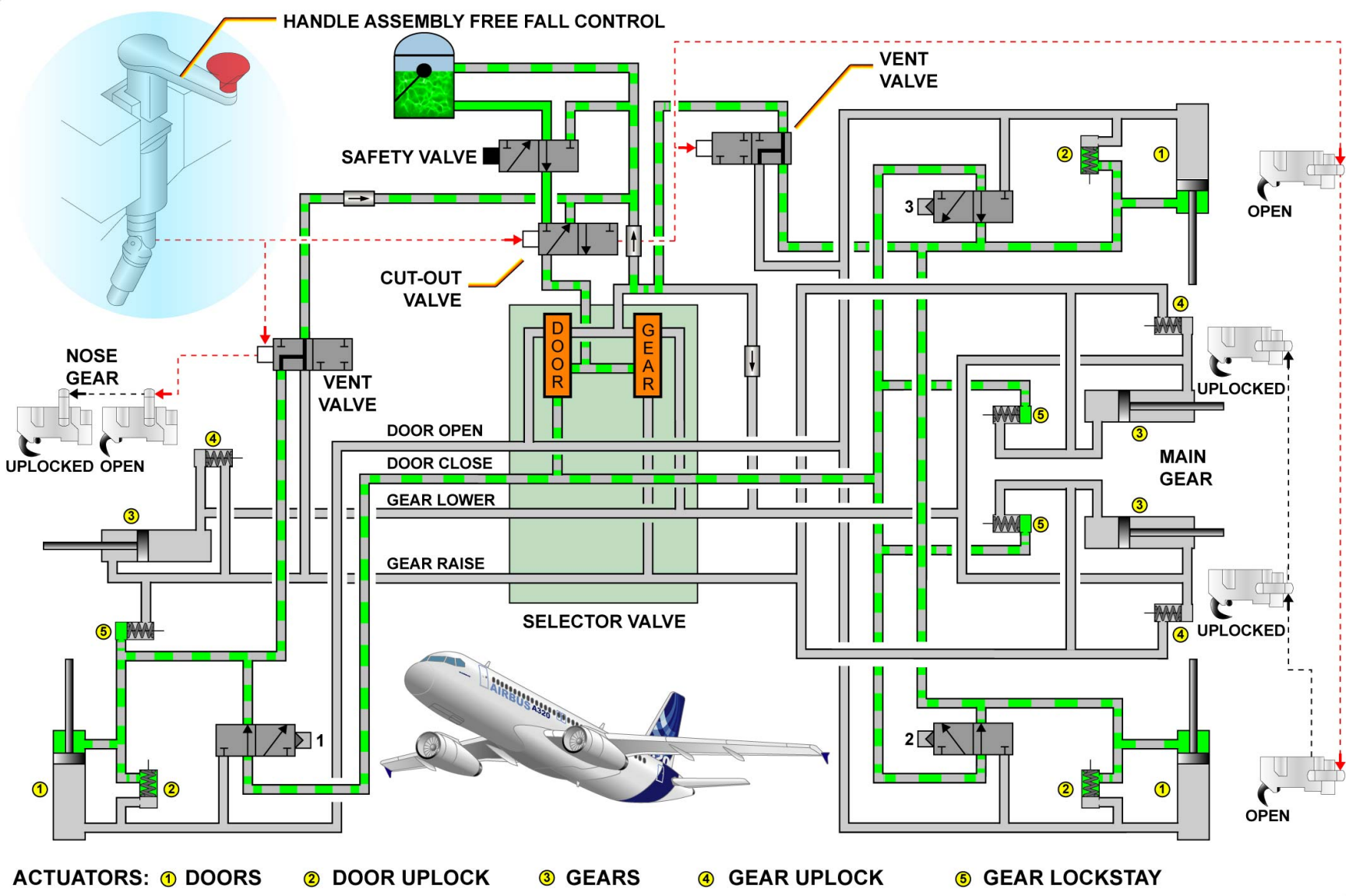

LEVER MOVEMENT BETWEEN 1.6 AND 1.8 TURNS

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LANDING GEAR FREE FALL EXTENSION (3)

LEVER MOVEMENT BETWEEN 1.9 AND 3 TURNS

Finally the gear uplocks are released and the landing gear extends by gravity.

NOTE: Normal L/G operation is restored by rotating the crank handle 3 turns counter-clockwise.

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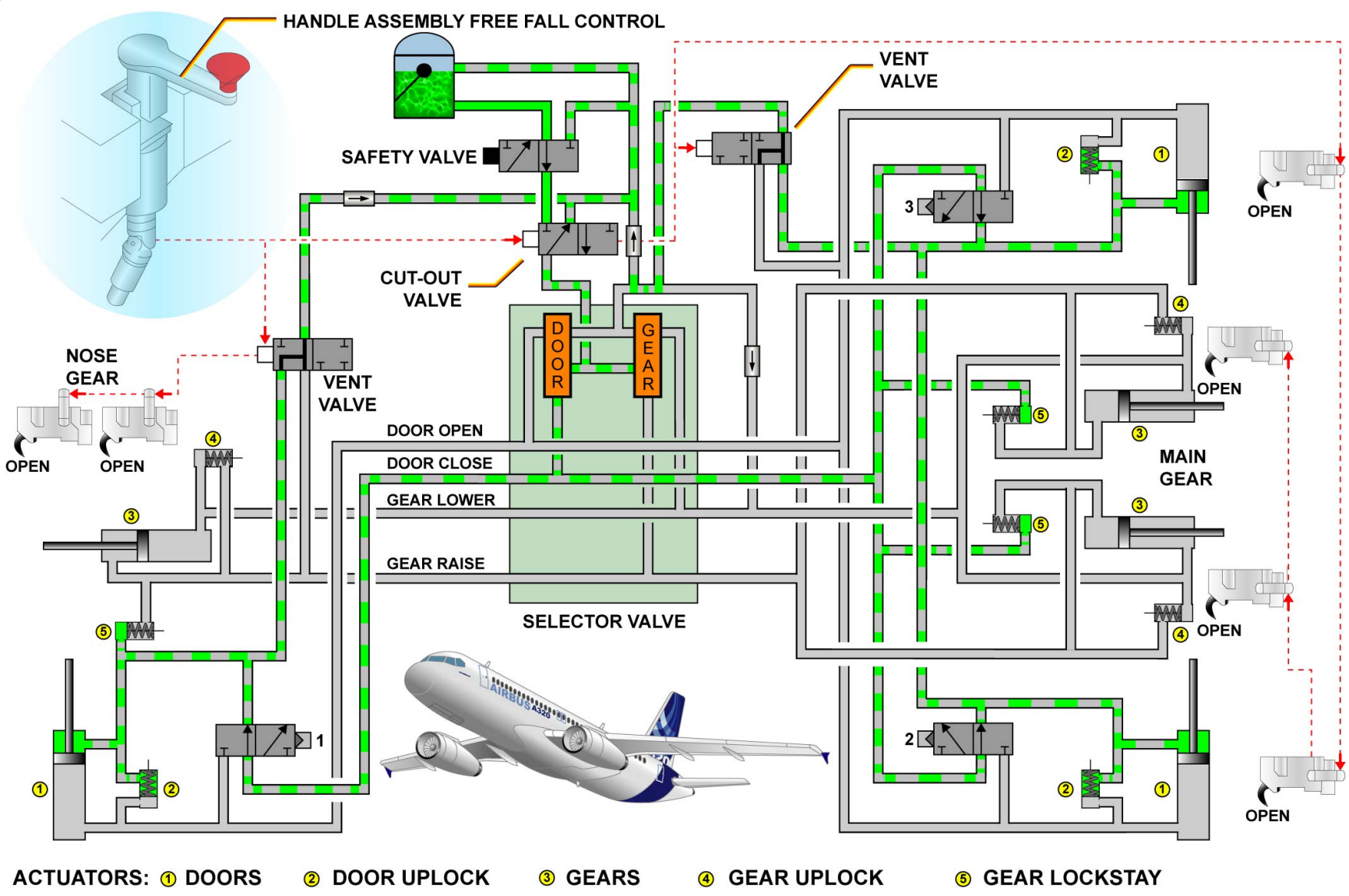

LEVER MOVEMENT BETWEEN 1.9 AND 3 TURNS

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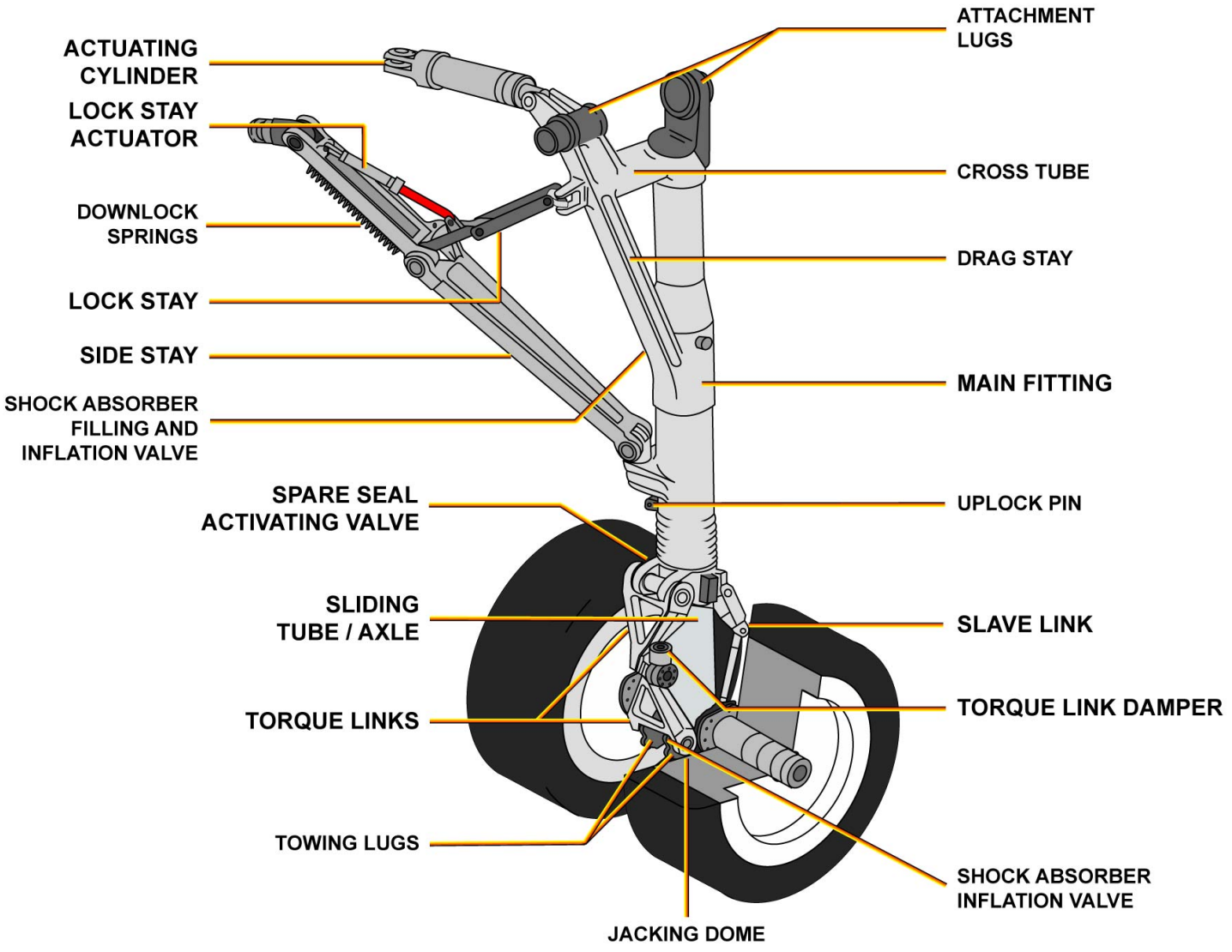
MAIN LANDING GEAR DESCRIPTION (3)

GENERAL

Each Main Landing Gear (MLG) includes these parts:
- a main fitting,
- a sliding tube,
- a shock absorber,
- a retraction actuating cylinder,
- a side stay assembly,
- a lock stay assembly and actuator,
- torque and slave links.

UGB13131 - U7ST0M0 - UM32D7000000001


ATTACHMENT LUGS
ACTUATING CYLINDER
LOCK STAY ACTUATOR
CROSS TUBE
DOWNLOCK SPRINGS
DRAG STAY
LOCK STAY
SIDE STAY
MAIN FITTING
SHOCK ABSORBER FILLING AND INFLATION VALVE
SPARE SEAL ACTIVATING VALVE
UPLOCK PIN
SLIDING TUBE / AXLE
SLAVE LINK
TORQUE LINKS
TORQUE LINK DAMPER
TOWING LUGS
SHOCK ABSORBER INFLATION VALVE
JACKING DOME

GENERAL

MAIN LANDING GEAR DESCRIPTION (3)

MAIN FITTING

The main fitting includes:
- the main barrel,
- the drag stay,
- the cross tube,
- the aircraft attachment lugs.

It contains a diaphragm and tube assembly that forms the top of the shock absorber. A pin connects the diaphragm and the tube assembly. This pin is located in the two lateral holes in the main fitting, and contains the shock absorber upper charging valve.

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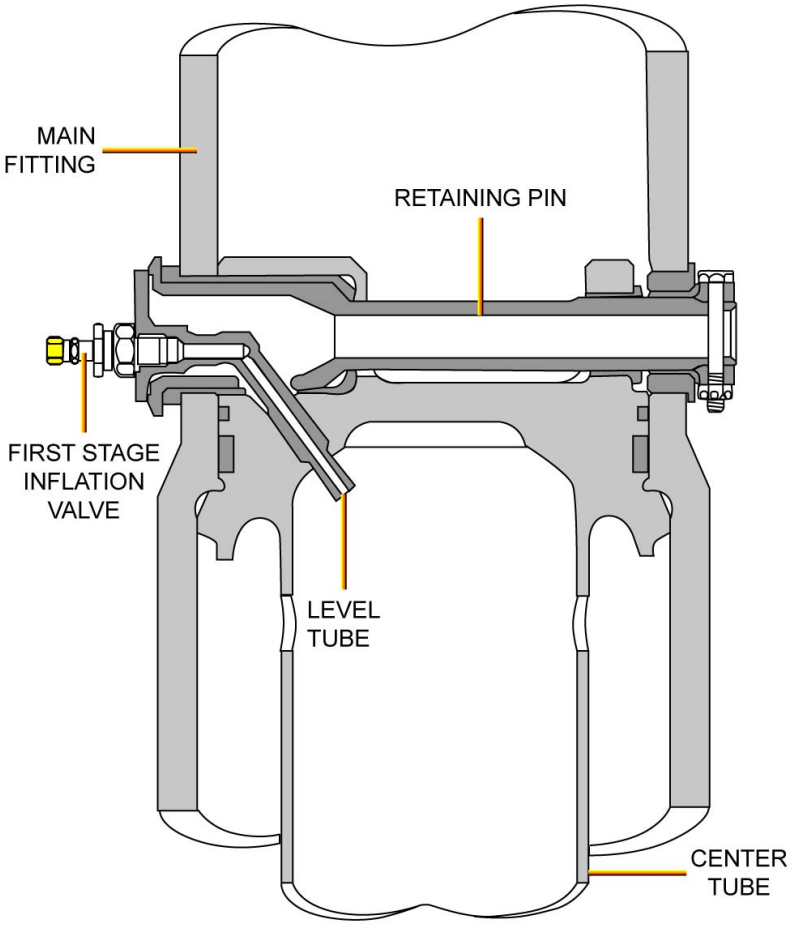

MAIN FITTING

MAIN LANDING GEAR DESCRIPTION (3)

MAIN FITTING (continued)

SHOCK ABSORBER

The shock absorber is a telescopic oleo-pneumatic unit which includes the sliding tube. It is installed in the main fitting to transmit the landing, take off and taxiing loads to the wing. When the shock absorber is compressed, the load is transmitted to the hydraulic fluid and nitrogen gas. The shock absorber is a 2 stage unit and contains four chambers:

- a first stage gas chamber contains gas at a low pressure and hydraulic fluid,
- a recoil chamber that contains hydraulic fluid,
- a compression chamber that contains hydraulic fluid,
- a 2nd stage gas chamber that contains gas at a high pressure.

Primary control of the shock absorber recoil is:

- the fluid flow from the recoil chamber into the gas chamber,
- the fluid flow from the gas chamber into the compression chamber.

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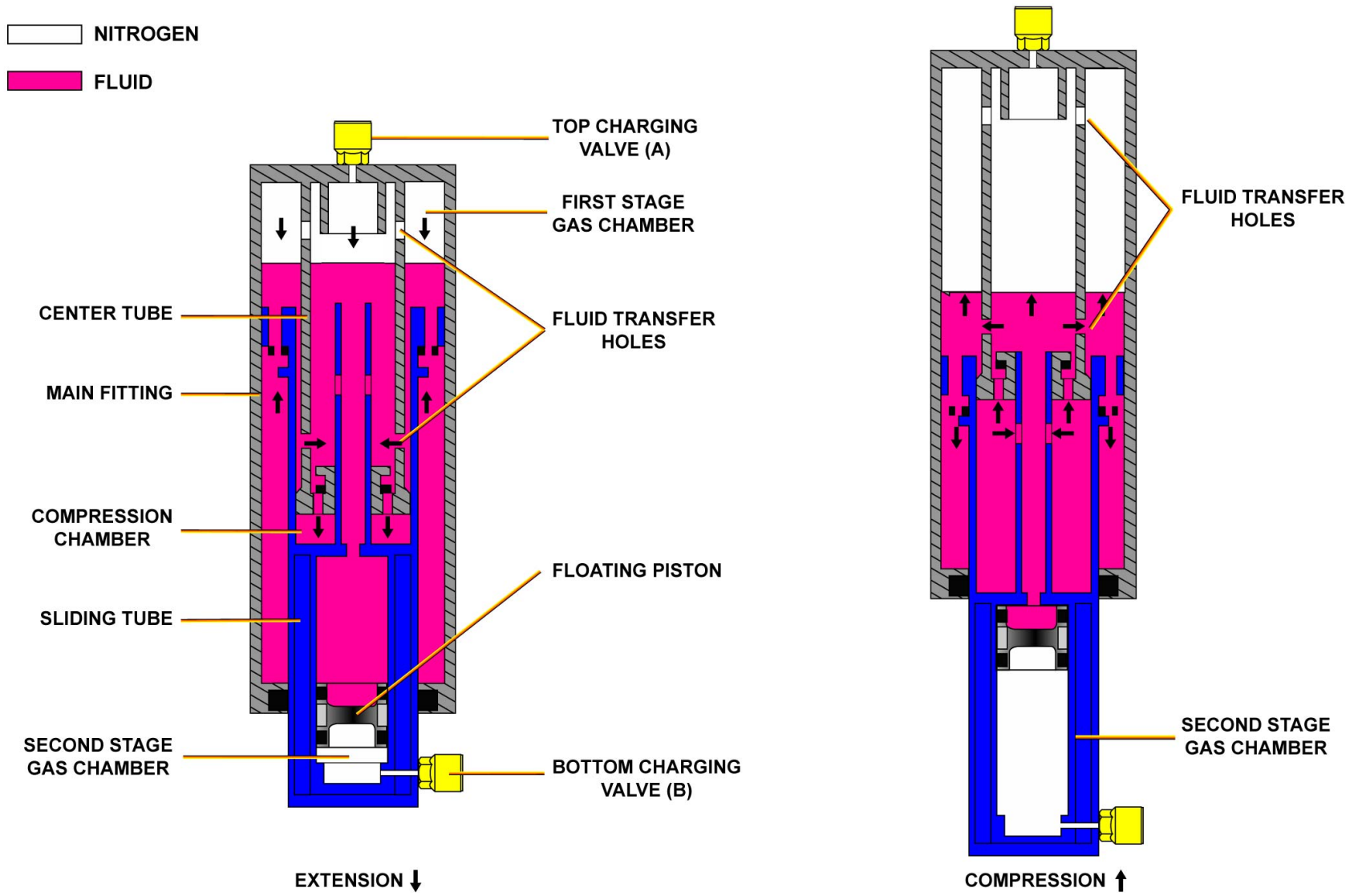


MAIN FITTING - SHOCK ABSORBER

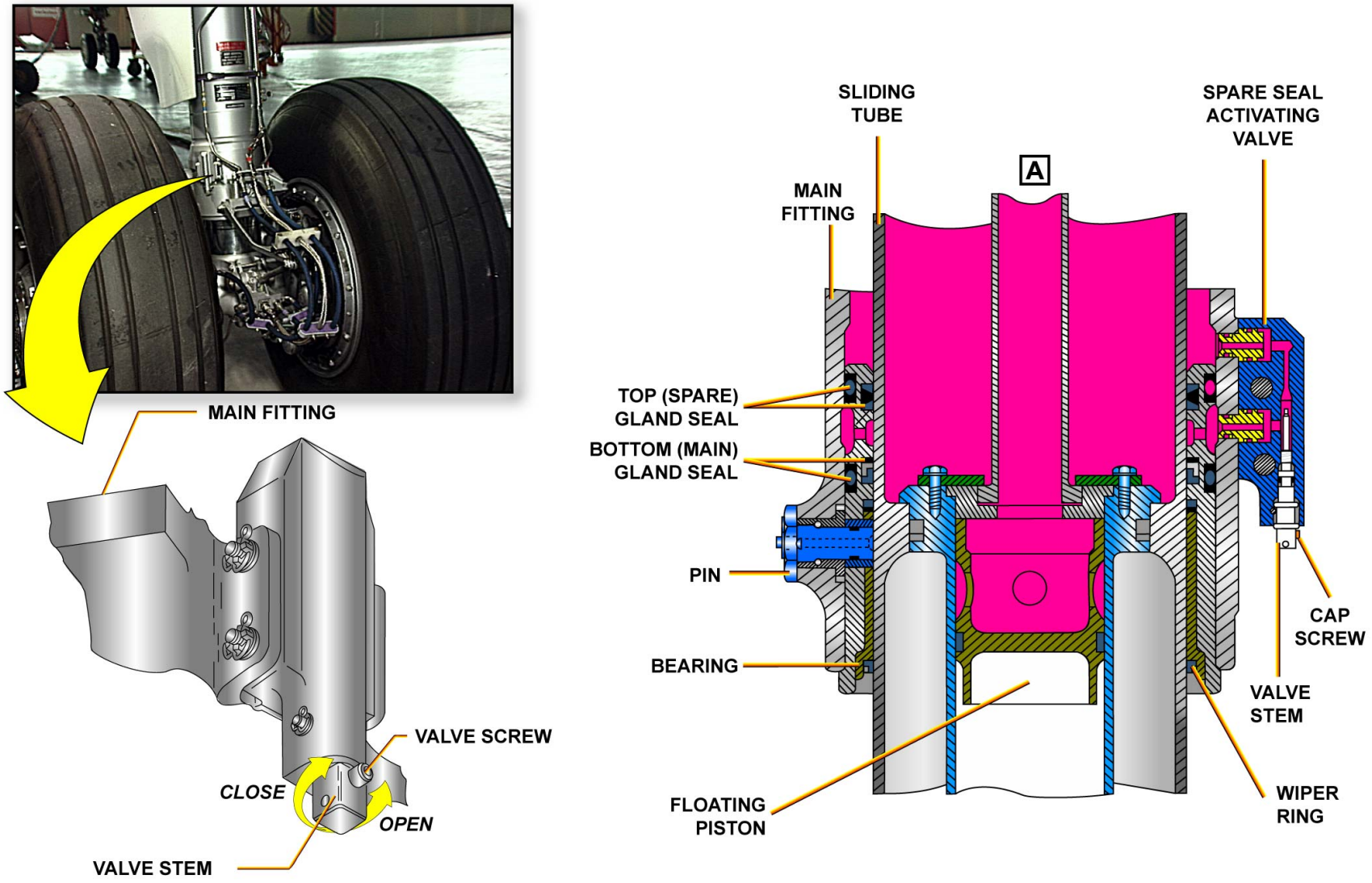
UGB13131 - U7ST0M0 - UM32D7000000001

MAIN LANDING GEAR DESCRIPTION (3)

MAIN FITTING (continued)

SPARE-SEAL ACTIVATING-VALVE

A gland housing assembly, at the bottom end of the main fitting, seals the joint between the main fitting and the sliding tube. A spare-seal activating-valve can isolate the bottom gland seals if a leak occurs.



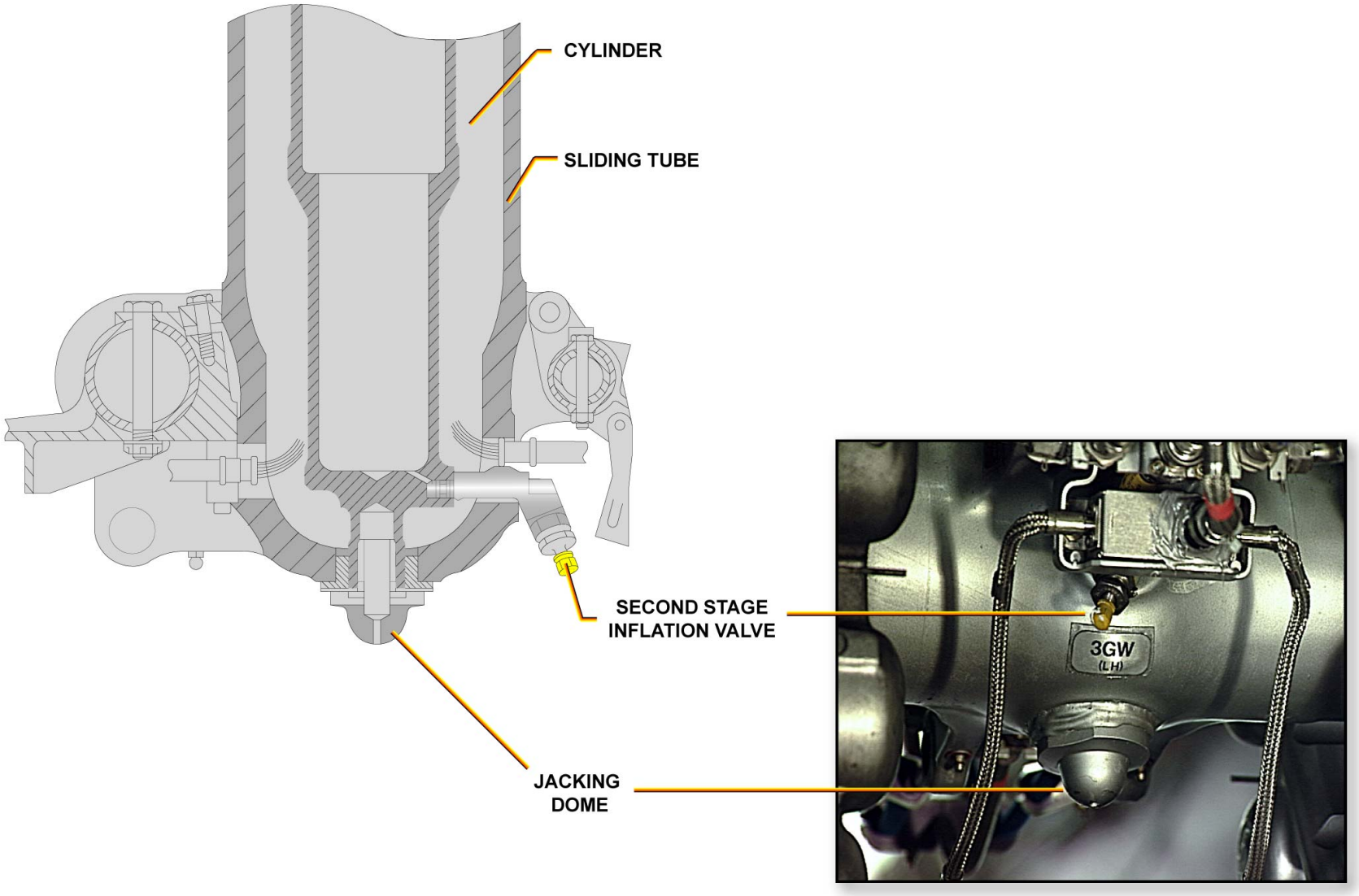
MAIN FITTING - SPARE-SEAL ACTIVATING-VALVE

MAIN LANDING GEAR DESCRIPTION (3)

SLIDING TUBE/AXLE

The sliding tube moves in the main fitting and is a primary component of the shock absorber. The axle and the sliding tube are part of same assembly. The second stage inflation valve of the shock absorber is on the sliding tube.

UGB13131 - U7ST0M0 - UM32D7000000001



SLIDING TUBE/AXLE

MAIN LANDING GEAR DESCRIPTION (3)

ACTUATING CYLINDER

The MLG actuating cylinder is installed on the main fitting at the piston rod end. Two lugs attach the body to the wing rear spar. When it is hydraulically supplied:
- the piston rod extends to retract the MLG,
- the piston rod retracts to extend the MLG.

SIDE STAY ASSEMBLY

The main components of the side stay assembly are:
- a basic side stay,
- a lock stay,
- a lock stay actuator,
- two lock springs,
- the proximity sensors and their related targets.

The lock springs move the lock stay to an over center position during the extension cycle.

LOCK STAY

The lock stay provides an over center stop and a geometric lock of the L/G.

LOCK STAY ACTUATOR

During MLG extension the two lock stay actuator ports are open to return; a restrictor controls the rate of MLG extension. It is pressurized to extend during MLG door closure until hydraulic pressure on the door close line is released. During MLG retraction, the hydraulic fluid retracts the piston which opens the over centered lock, to fold the side stay and the lock stay against the lock springs.

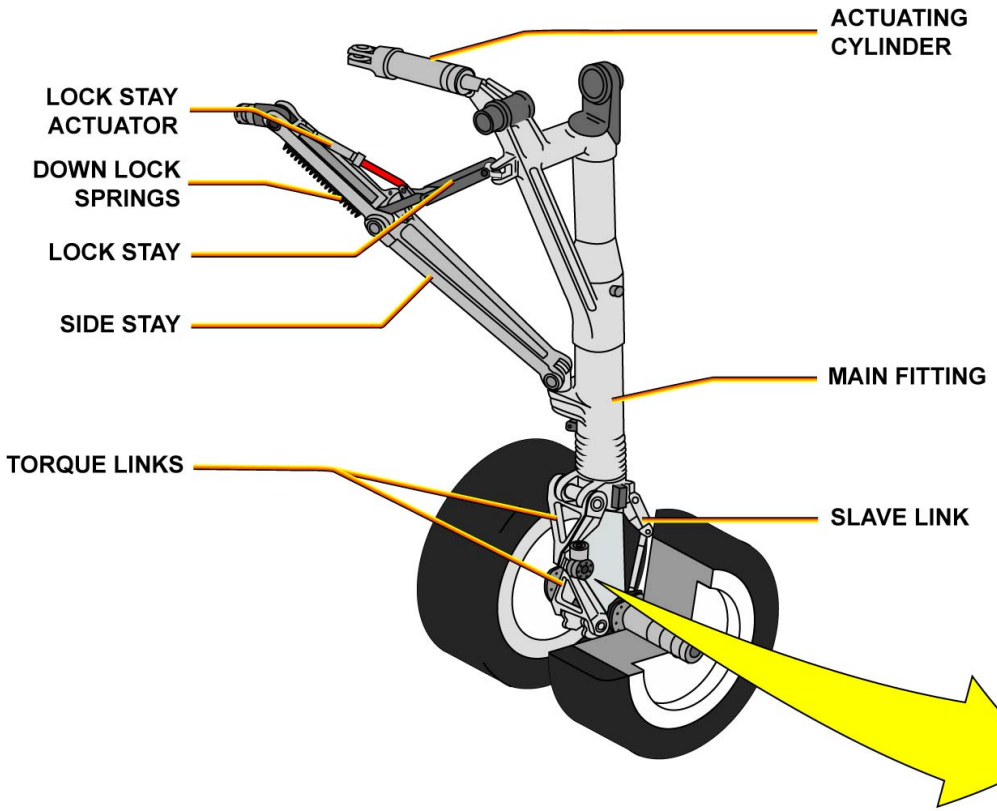
TORQUE LINKS/SLAVE LINK

The torque links align the main fitting and the sliding tube, but let vertical movement between the parts occur. The slave link is mounted at the rear.

TORQUE LINK DAMPER

The torque link damper is a spring-centered, two-way hydraulic unit, which has its own hydraulic reservoir. Its function is to decrease the landing vibrations through the torque links. The hydraulic fluid contents of the damper are shown by the extension of the reservoir when it is pressurized. When the contents are correct, the "FULL" and "REFILL" level indications are in view.

UGB13131 - U7ST0M0 - UM32D7000000001



TORQUE LINK DAMPER

ACTUATING CYLINDER ... TORQUE LINK DAMPER

MAIN LANDING GEAR DOORS DESCRIPTION (2)

GENERAL

Each Main Landing Gear (MLG) is enclosed by one door and two fairings:
- one main door,
- one hinged fairing,
- one fixed fairing.

MAIN DOOR

The main door is attached to the fuselage structure by two hinges and is operated by a hydraulic actuator. Attached to the forward end of the main door are the hydraulic actuator and an uplock roller that is used to keep the main door in the closed position. Installed on the rear end of the main door are steps, used for access to the gear well compartment. Two ramps are installed on the inside of the main door. These ramps make sure that the gear does not catch on the main door during a free-fall extension. Two proximity sensors and targets send the door open position signal of the main door to the Landing Gear Control and Interface Units (LGCIUs).

MLG DOOR UPLOCK

The MLG door uplock is closed mechanically, locking the door in the closed position and hydraulically opened, releasing the door during normal extension and retraction sequences. The uplock can also be opened mechanically in free-fall extension and ground door opening.

HINGED FAIRING

The hinged fairing is attached to the wing skin by a single hinge and to the L/G by an adjustable tie-rod. The adjustable tie-rod causes the hinged fairing to follow the L/G during the L/G extension and retraction.

FIXED FAIRING

The fix fairing is attached to the gear on 5 points and is fully adjustable in vertical and horizontal directions.

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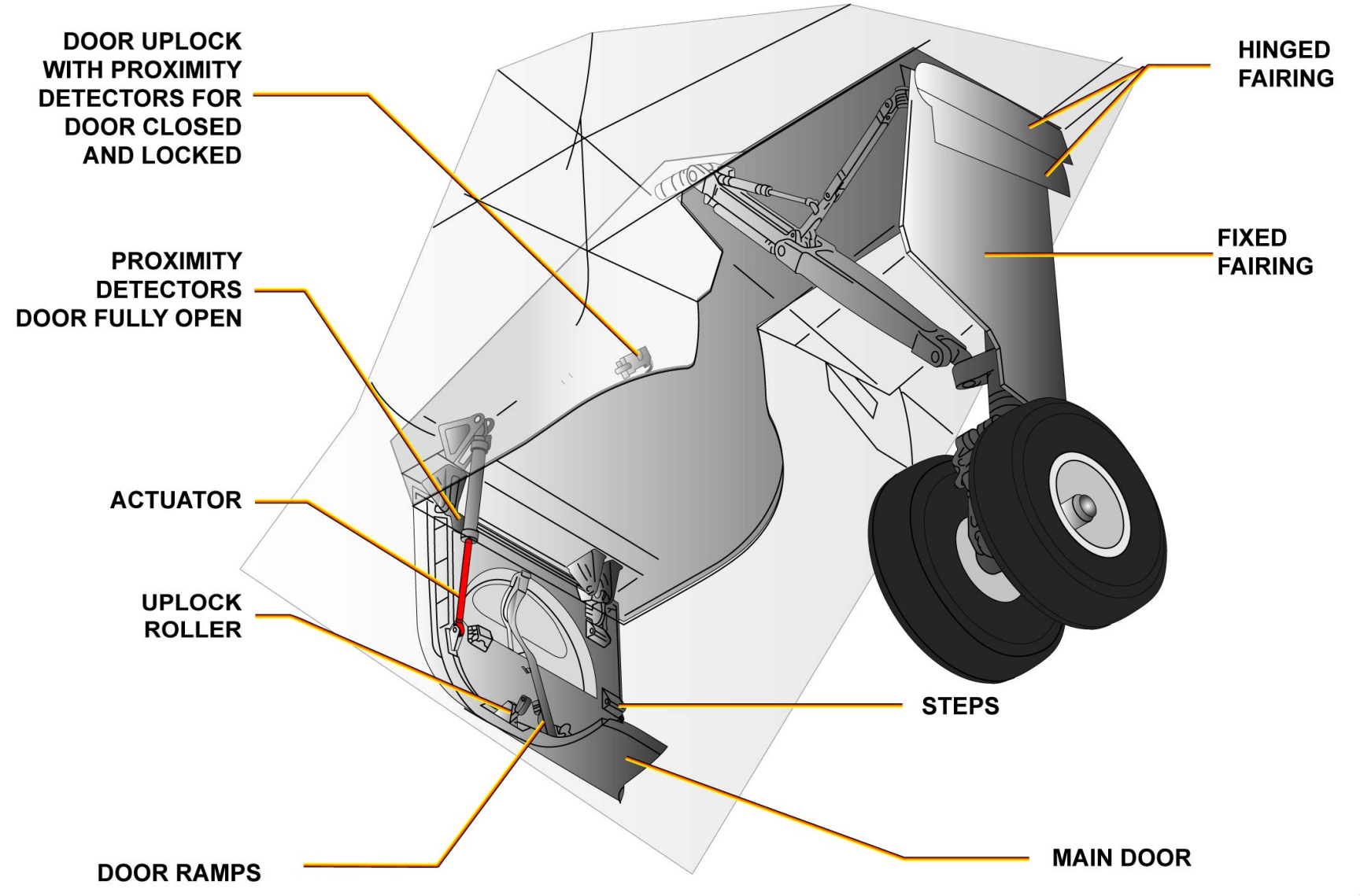

GENERAL ... FIXED FAIRING

NOSE LANDING GEAR DESCRIPTION (3)

GENERAL

The nose gear retracts forward into the fuselage, and is thus favorably assisted by aerodynamic moments during gear extension.
The nose gear includes:
- a shock strut assembly,
- a drag strut assembly,
- a lock stay assembly,
- a gear actuating cylinder,
- nose wheel steering system components.

SHOCK STRUT ASSEMBLY

The shock strut assembly is attached to the structure by two trunnions.
It includes the shock absorber.

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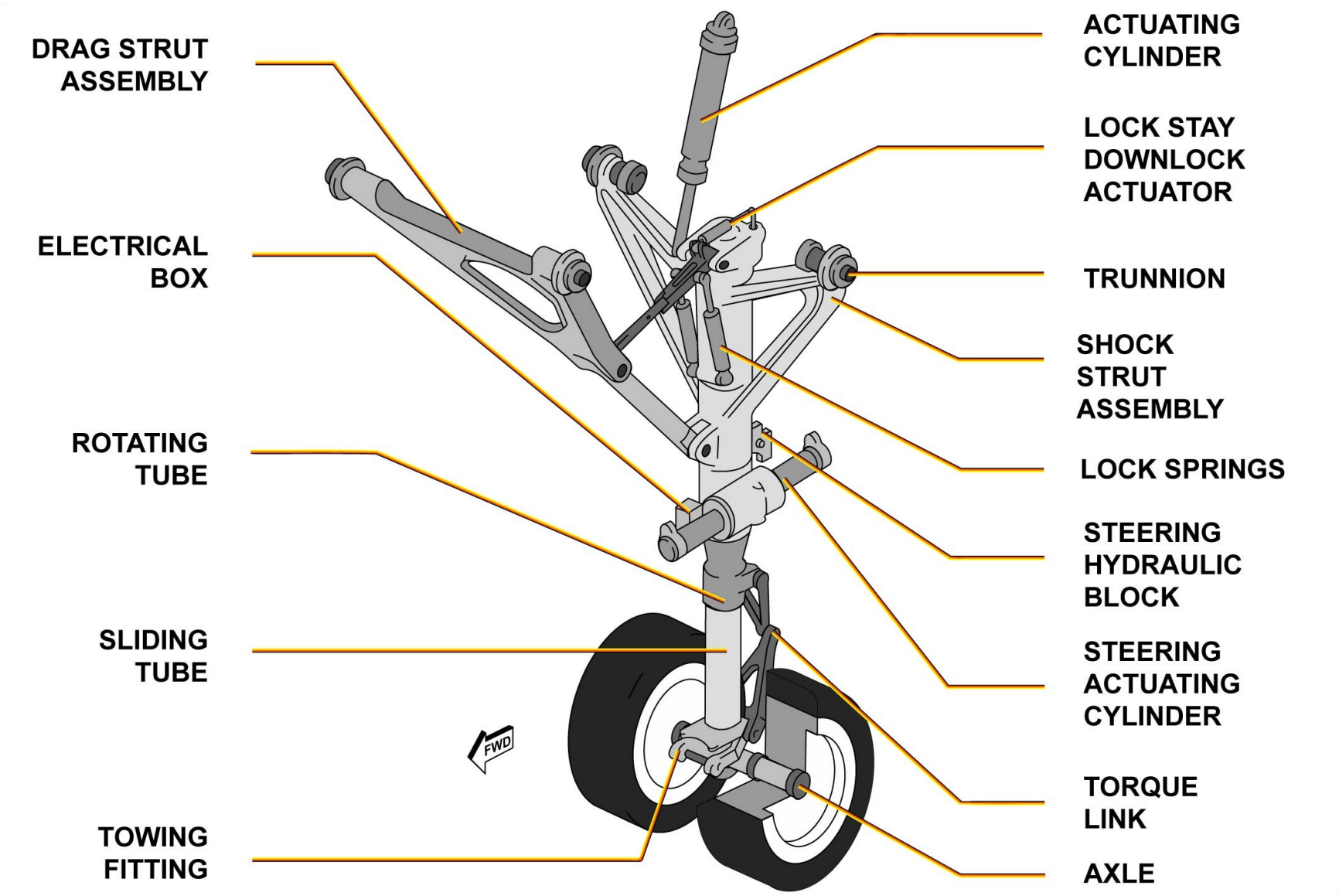

GENERAL & SHOCK STRUT ASSEMBLY

NOSE LANDING GEAR DESCRIPTION (3)

SHOCK ABSORBER

The shock absorber is of the single chamber type without a separation piston and is double acting. The shock absorber is filled with hydraulic fluid and nitrogen through a single standard servicing valve in the upper part of the leg. Calibration of the metering devices in the shock absorber is the same for the different versions of the aircraft. Holes are included in the leg to show possible leaks from the dynamic seal of the shock absorber. It is possible to remove the shock absorber without drainage of the hydraulic fluid. A placard bonded to the leg shows the filling curves.

The shock absorber includes 2 centering cams, the lower cam is part of the plunger tube and the upper cam is part of the sliding tube. When the shock absorber is fully extended the pressure of the nitrogen causes the cams to engage. The wheels then return automatically to the center position.

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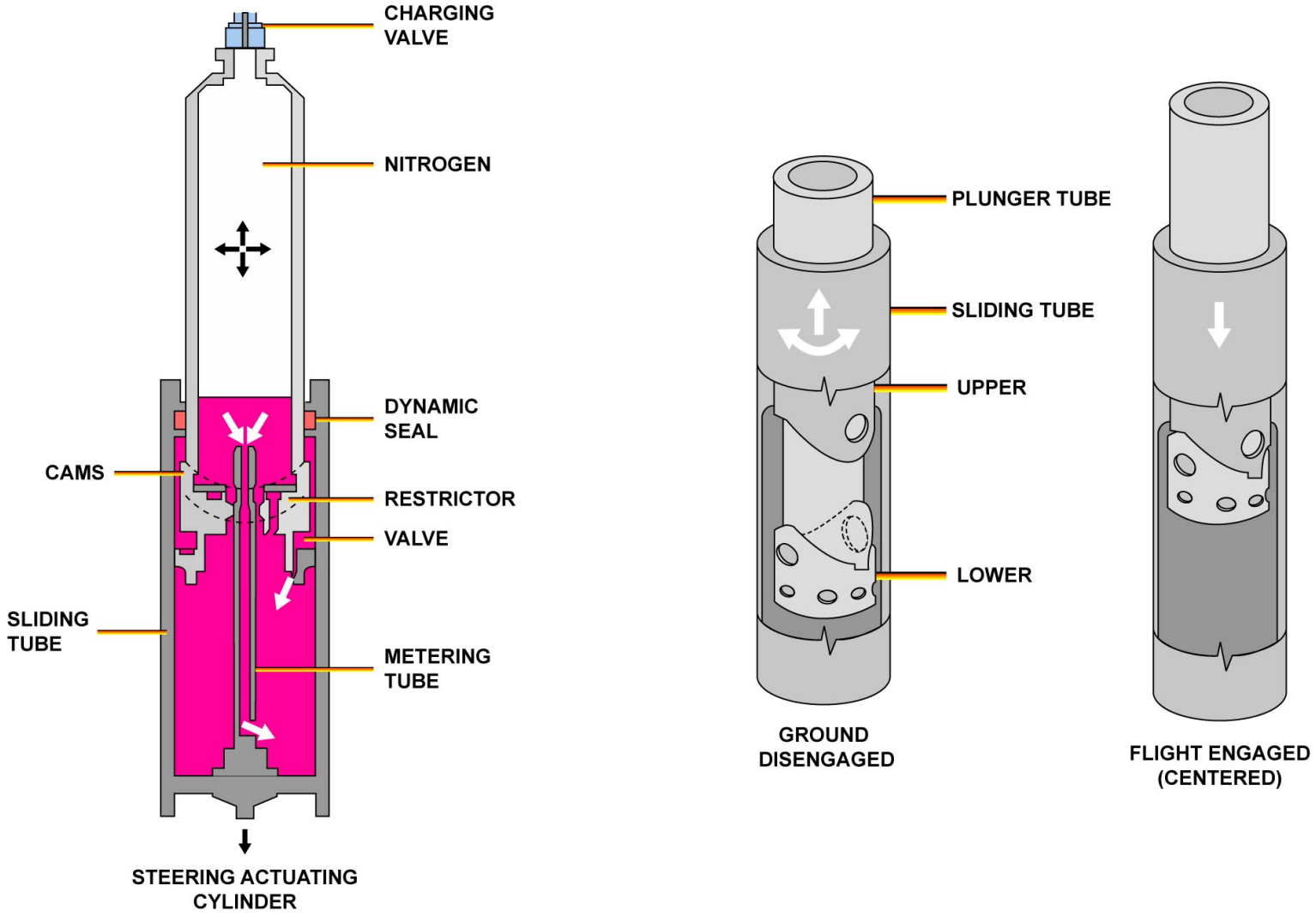

SHOCK ABSORBER

NOSE LANDING GEAR DESCRIPTION (3)

ACTUATING CYLINDER

The actuating cylinder operates the nose gear during retraction and extension sequences.

DRAG STRUT ASSEMBLY

The drag strut assembly consists of a forestay at the top and a tubular arm at the bottom that are interconnected by a universal joint. The uplock roller is installed on the upper hinge pin of the universal joint.

LOCKSTAY DOWNLOCK ACTUATOR

The downlock actuator locks and unlocks both brace assemblies of the lock stay. It is assisted by two springs.

SLIDING TUBE

The sliding tube includes the wheel axle. It is inclined 9 degrees forward; this design allows the wheels to return freely to the centered position and decrease the shimmy effect. The towing lug is designed to shear if the towing load is more than the limit. The two system proximity detectors provide signals for both gear extended and wheel centered positions.

ROTATING TUBE

The rotating tube is inside the shock strut. It is equipped with a pinion that transmits steering orders from the steering actuating cylinder via the rotating tube and the torque link to the wheel axle.

TORQUE LINK

The torque link is installed on the rear. It connects the sliding tube to the rotating tube.

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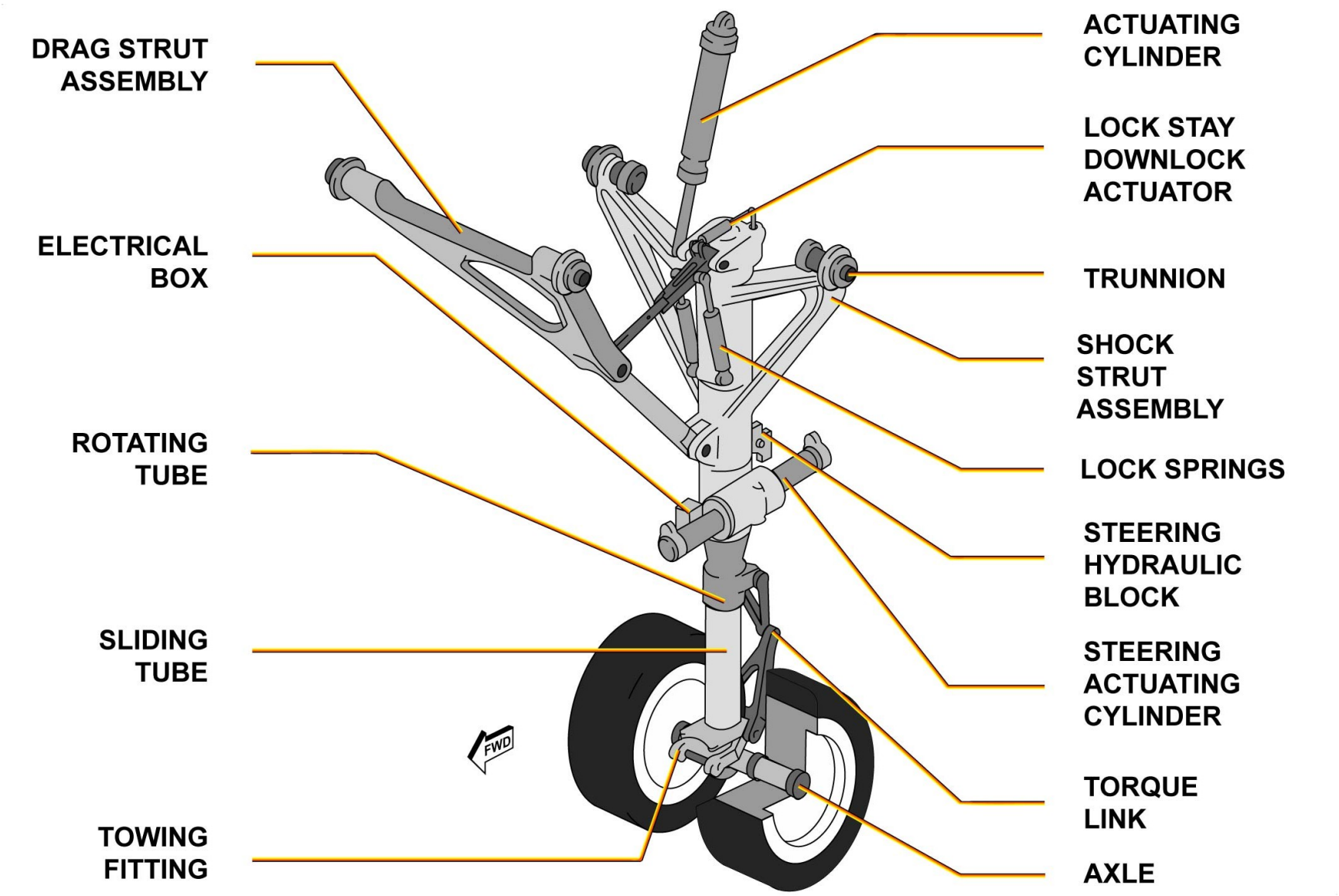

ACTUATING CYLINDER ... TORQUE LINK

NOSE LANDING GEAR DESCRIPTION (3)

LOCKSTAY ASSEMBLY

The lock stay assembly provides an over centered stop and a geometric lock of the nose gear. It includes both systems downlock proximity detectors. On the ground, a safety pin locks the two arms of the lock stay.

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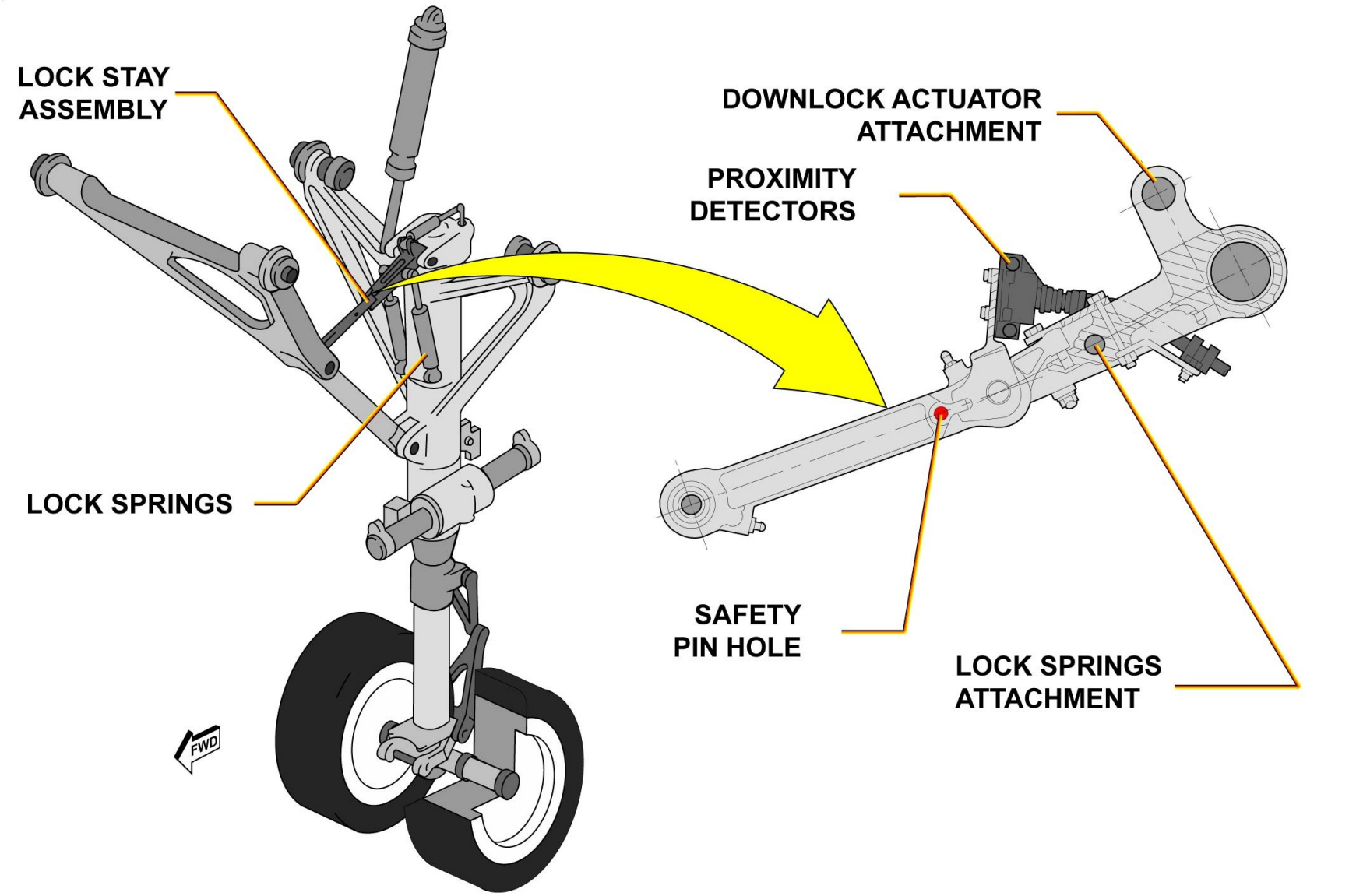


LOCKSTAY ASSEMBLY

NOSE LANDING GEAR DOORS DESCRIPTION (2)

GENERAL

The doors of the NLG include:
- two main doors,
- two aft doors,
- one leg door.

MAIN DOORS

The two main doors are hydraulically operated. These two doors are connected mechanically to the A/C by a linkage that has two control rods connected to the same bellcrank. This bellcrank is installed at the roof of the L/G well and is operated by one double-acting actuator. An uplock assembly latches the doors in the closed position.

PROXIMITY DETECTORS

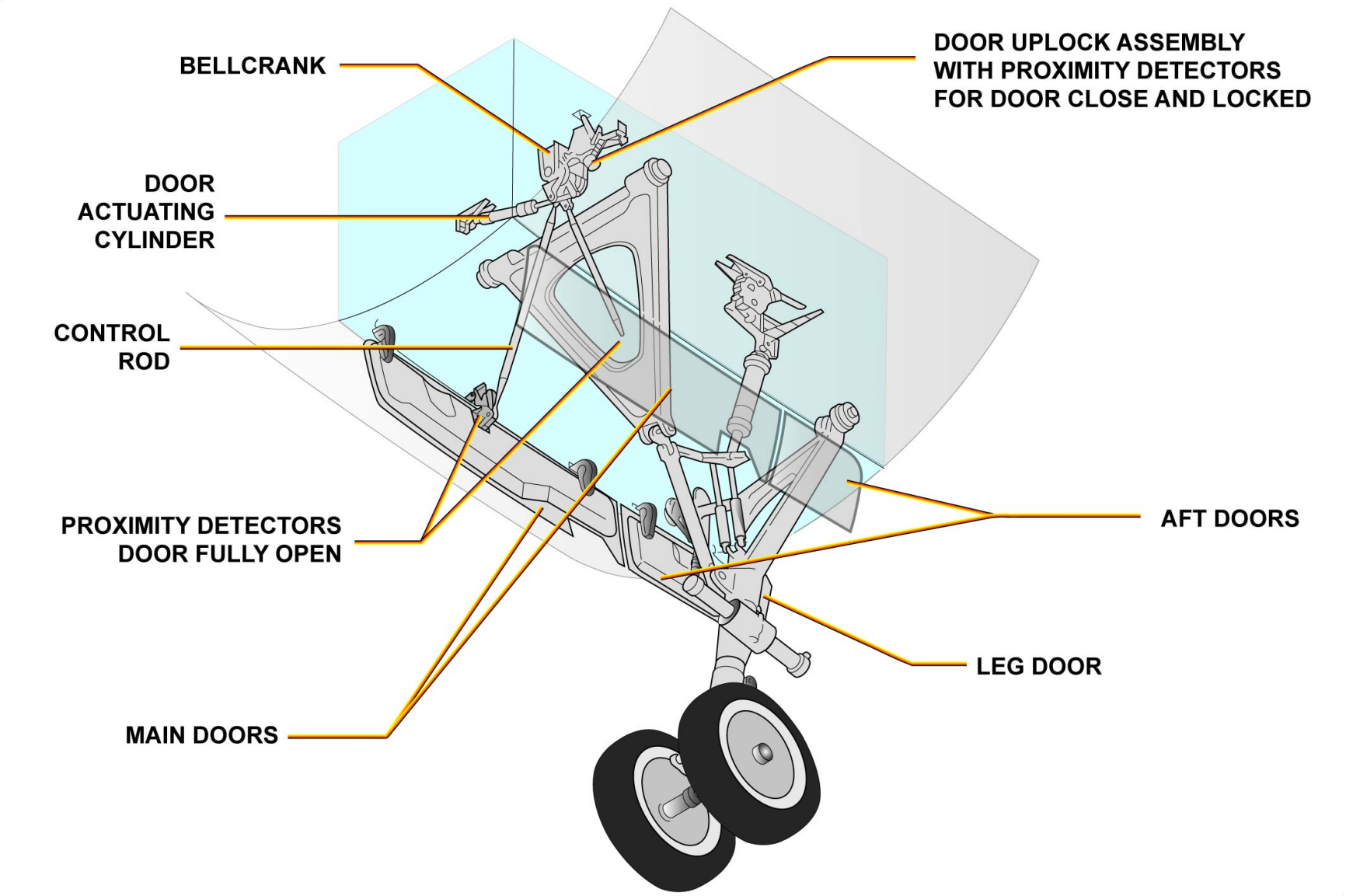
Two proximity switch detectors per door provide a signal in the open position. The doors must be in this position to permit the gear to operate. The signals are sent to the two systems, one signal per doors by system
.

AFT DOORS

The two aft doors are symmetrical, hinged to the fuselage and connected by an adjustable rod to the gear leg. These doors close the aft part of the nose gear well when the gear is retracted.

LEG DOOR

The leg door is attached to the rear part of the gear leg. When the gear is retracted, this door closes off the area through which the drag strut passes when the gear is extended.



GENERAL ... LEG DOOR

LANDING GEAR SAFETY PRECAUTIONS (2)

L/G CONTROL LEVER

The lever is locked in the "DOWN" position by an interlock mechanism as soon as either Landing Gear Control and Interface Unit (LGCIU) detects any shock absorber not extended or nose wheels not centered.

NOTE: The nose gear shock absorber extended and nose wheels centered signal comes from the same proximity detectors.

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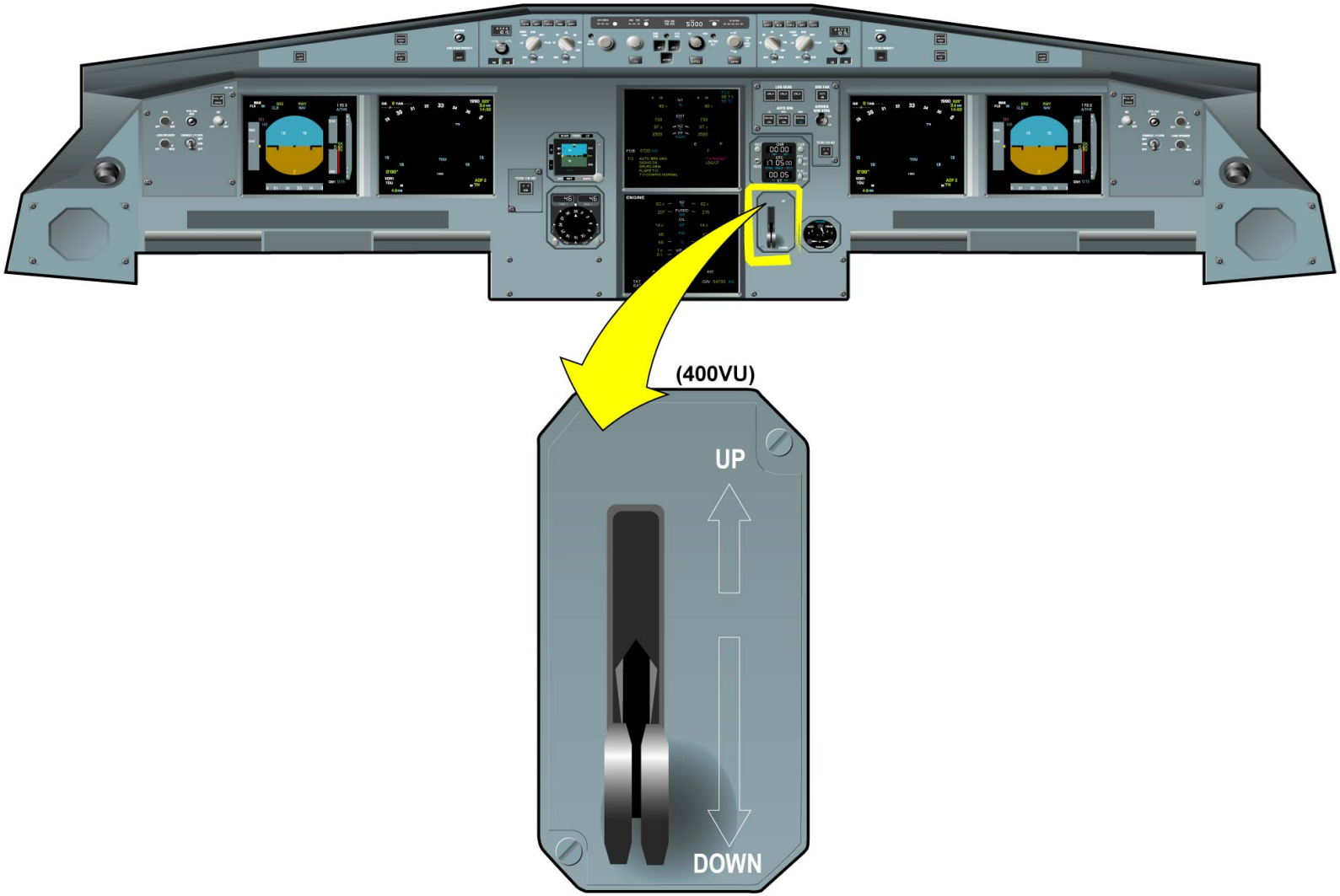

L/G CONTROL LEVER

L/G CONTROL LEVER

LANDING GEAR SAFETY PRECAUTIONS (2)

HYDRAULICS

Be sure that all safety precautions are observed before working on the L/G:
- wheel chocks are in place,
- the hydraulic system is depressurized,
- safety sleeves and safety pins are fitted on the L/G and L/G doors,
- ground door opening handles are in the open position.

MLG AND MLG DOOR SAFETY DEVICES

Installation of the safety devices on the MLG and MLG doors.

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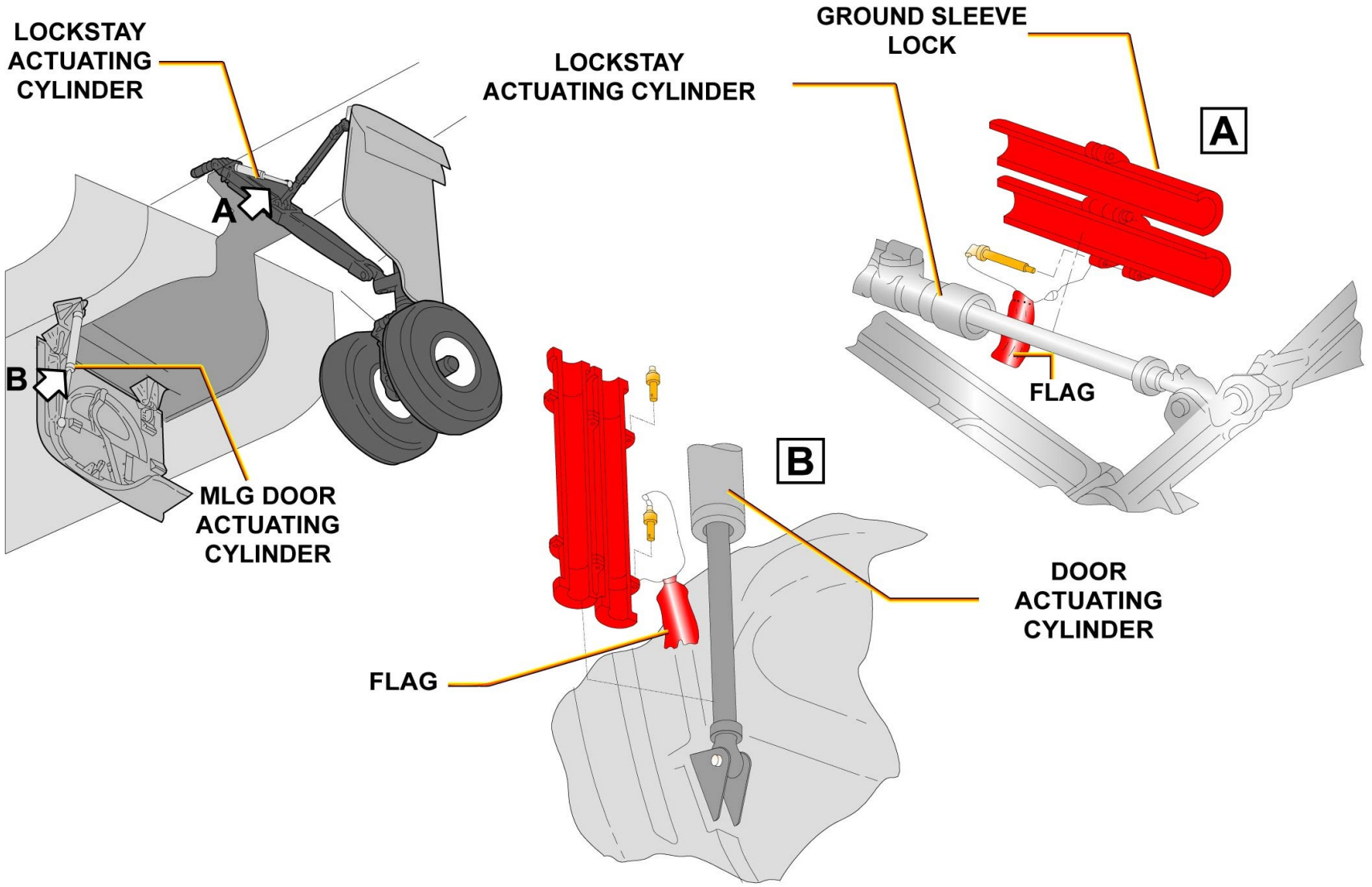


HYDRAULICS - MLG AND MLG DOOR SAFETY DEVICES

LANDING GEAR SAFETY PRECAUTIONS (2)

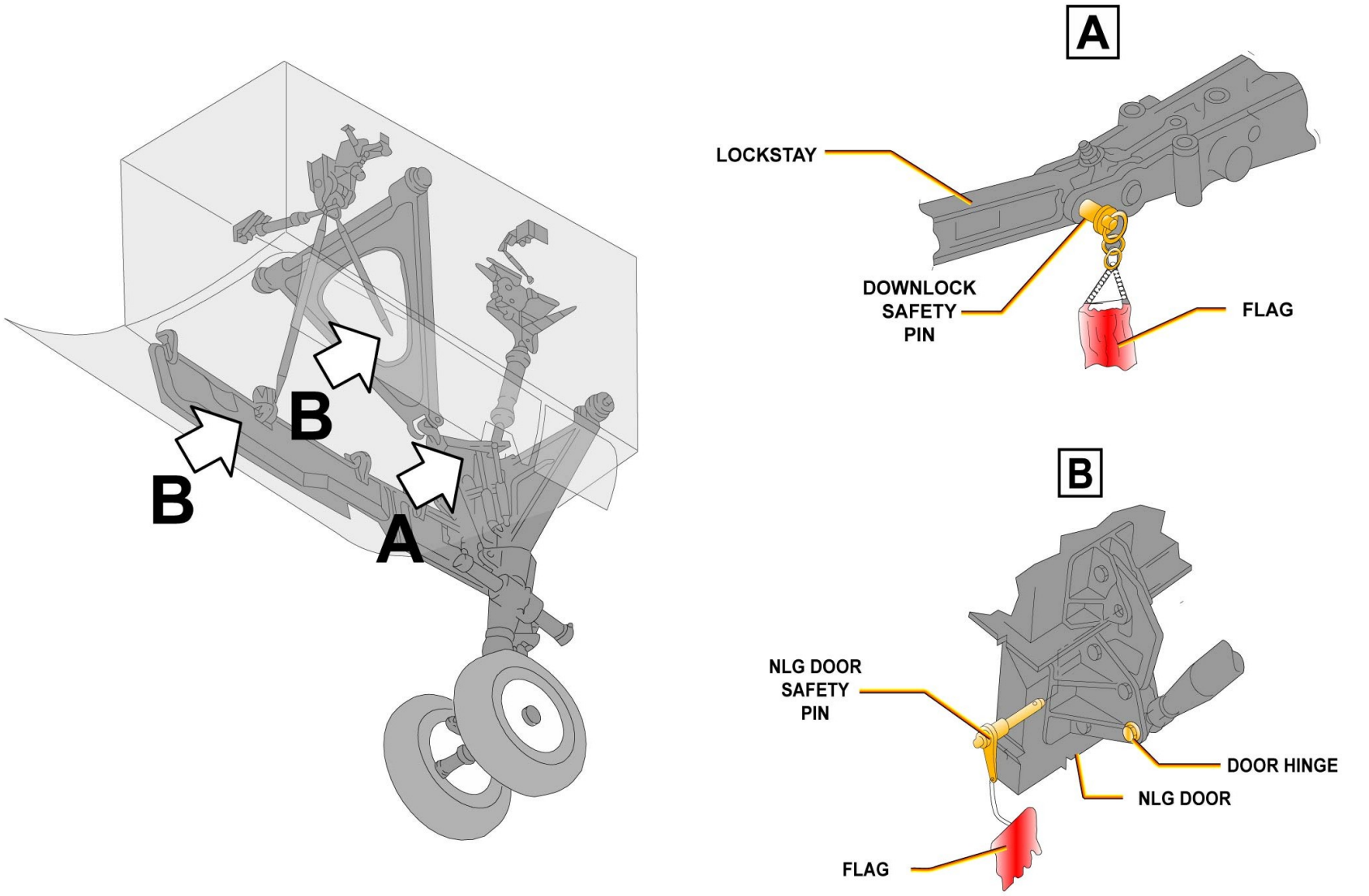
HYDRAULICS (continued)

NLG AND NLG DOOR SAFETY DEVICES

Installation of the safety devices on the NLG and NLG doors.

NOTE: Note: Proximity sensors omitted for clarity.

UGB13131 - U7ST0M0 - UM32D3000000001



HYDRAULICS - NLG AND NLG DOOR SAFETY DEVICES

LANDING GEAR DOORS GROUND OPERATION (2)

MLG DOOR GROUND OPERATION

The MLG doors can be opened on the ground, for servicing or inspection purposes.

DOOR OPENING PREPARATION

Before you start the task, make sure that the Ground Safety Locks are installed on the landing gear.
In the flight-deck check that the Landing Gear Control-lever is in the "down" position and the Gravity Gear Extension Handle is in "neutral and stowed" position. Check on the ECAM Hydraulic page that the hydraulic systems are depressurized.

NOTE: Note: Place warning notices to tell personal not to pressurize the hydraulic systems, not to operate the Landing Gear Control lever, or the Gravity Gear Extension Handle.

DOOR OPENING

Open the access panel 195BB for the left MLG, or 196BB for the right MLG Door.
Remove the safety pin from the ground door opening handle. Stand clear of the door travel range and observe the travel area.
Push and hold the button to move the handle fully down. Re-install the safety pin on the pushbutton.
Install the safety-sleeve on the MLG-Door actuator and secure it with the ball-lock pins.
You might need to push the door to the fully open position to ease the safety sleeve installation.
The landing gear door will be shown on the ECAM WHEEL page in the fully open position.

DOOR CLOSING PREPARATION

Before you start the task, make sure that the Ground Safety Locks are installed on the landing gear. The travel ranges of the flight controls are clear.
On the gear make sure that the Ground Door Opening Handle is in the open position and the safety sleeve is still installed on the MLG Door actuator.
In the flight-deck, check that the landing gear control-lever is in the "down" position and the Gravity Gear Extension Handle is in "neutral and stowed" position.
Check on the ECAM Hydraulic Page that no warning messages are displayed.
Pressurize the green hydraulic system via the PTU by using the Yellow Electric Pump.

NOTE: Note: Only pressurize the systems required for this task.

DOOR CLOSING

Confirm that the Ground Door Opening Handle is still in the open position and remove the safety sleeve from the MLG Door actuator.
Remove the safety pin from the ground door opening handle. Stand clear of the door travel range and observe the travel area.
Push and hold the button to move the handle fully up. Re-install the safety pin on the pushbutton.
Close the access panel.
In the flight-deck check on the ECAM WHEEL Page that the landing gear door is shown in the fully closed position.
Depressurize the hydraulic systems and remove the warning notices.

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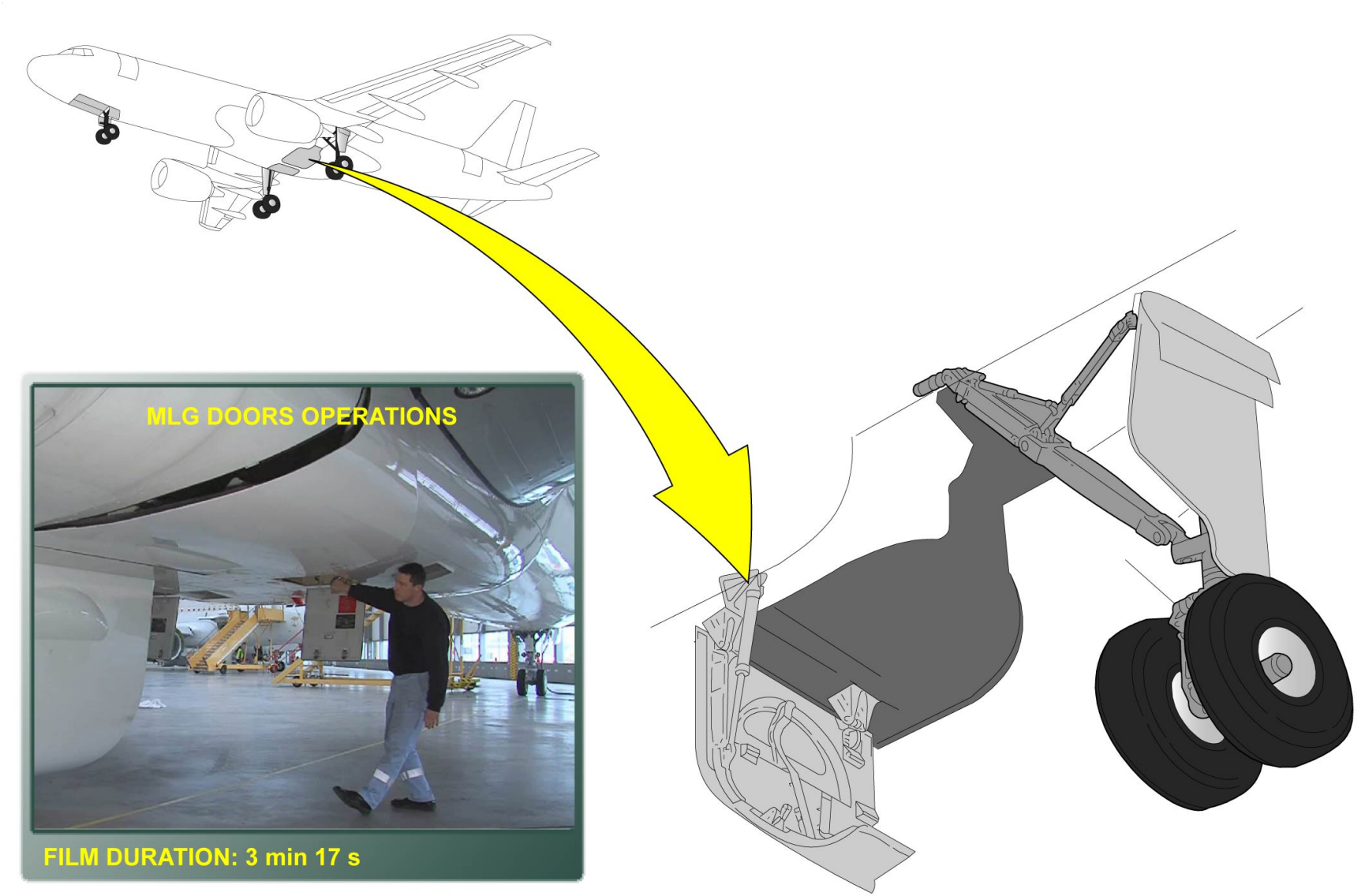

MLG DOOR GROUND OPERATION - DOOR OPENING PREPARATION ... DOOR CLOSING

LANDING GEAR DOORS GROUND OPERATION (2)

NLG DOORS GROUND OPERATION

The NLG doors can be opened on the ground, for servicing or inspection purposes.

DOORS OPENING PREPARATION

Before you start the task, make sure that the Ground Safety Locks are installed on the landing gear.
In the flight-deck, check that the Landing Gear Control-lever is in the "down" position and the Gravity Gear Extension Handle is in "neutral and stowed" position.
Check on the ECAM Hydraulic Page that the hydraulic systems are depressurized.

NOTE: Note: Place warning notices to tell personal not to pressurize the hydraulic systems, not to operate the Landing Gear Control lever, or the Gravity Gear Extension Handle.

DOORS OPENING

Stand aft and left of the Nose Landing Gear to gain access to the Ground Door Opening Handle. Remove the safety pin from the handle.
Stand clear of the travel range of the doors and observe the travel area.
Push and hold the button to move the handle fully down. Re-install the safety pin on the pushbutton.
Install the safety-pin on each of the NLG-Doors.
You might need to manually adjust the door position to ease the safety pin installation.
The landing gear doors will be shown on the ECAM WHEEL Page in the fully open position.

DOORS CLOSING PREPARATION

Before you start the task, make sure that the Ground Safety Locks are installed on the landing gear. The travel ranges of the flight controls are clear.
On the gear, make sure that the Ground Door Opening Handle is in the open position and the safety pins are still installed on the NLG Doors.
In the flight-deck check that the landing gear control-lever is in the "down" position and the Gravity Gear Extension Handle is in "neutral and stowed" position.
Check on the ECAM Hydraulic Page that no warning messages are displayed.
Pressurize the green hydraulic system via the PTU by using the Yellow Electric Pump.

NOTE: Note: Only pressurize the systems required for this task

DOORS CLOSING

Confirm that the Ground Door Opening Handle is still in the open position and remove the safety pins from the NLG Doors.
Remove the safety pin from the ground door opening handle. Stand clear of the door travel range and observe the travel area.
Push and hold the button to move the handle fully up. Re-install the safety pin on the pushbutton.
In the flight-deck check on the ECAM WHEEL Page that the landing gear door is shown in the fully closed position.
Depressurize the hydraulic systems and remove the warning notices.

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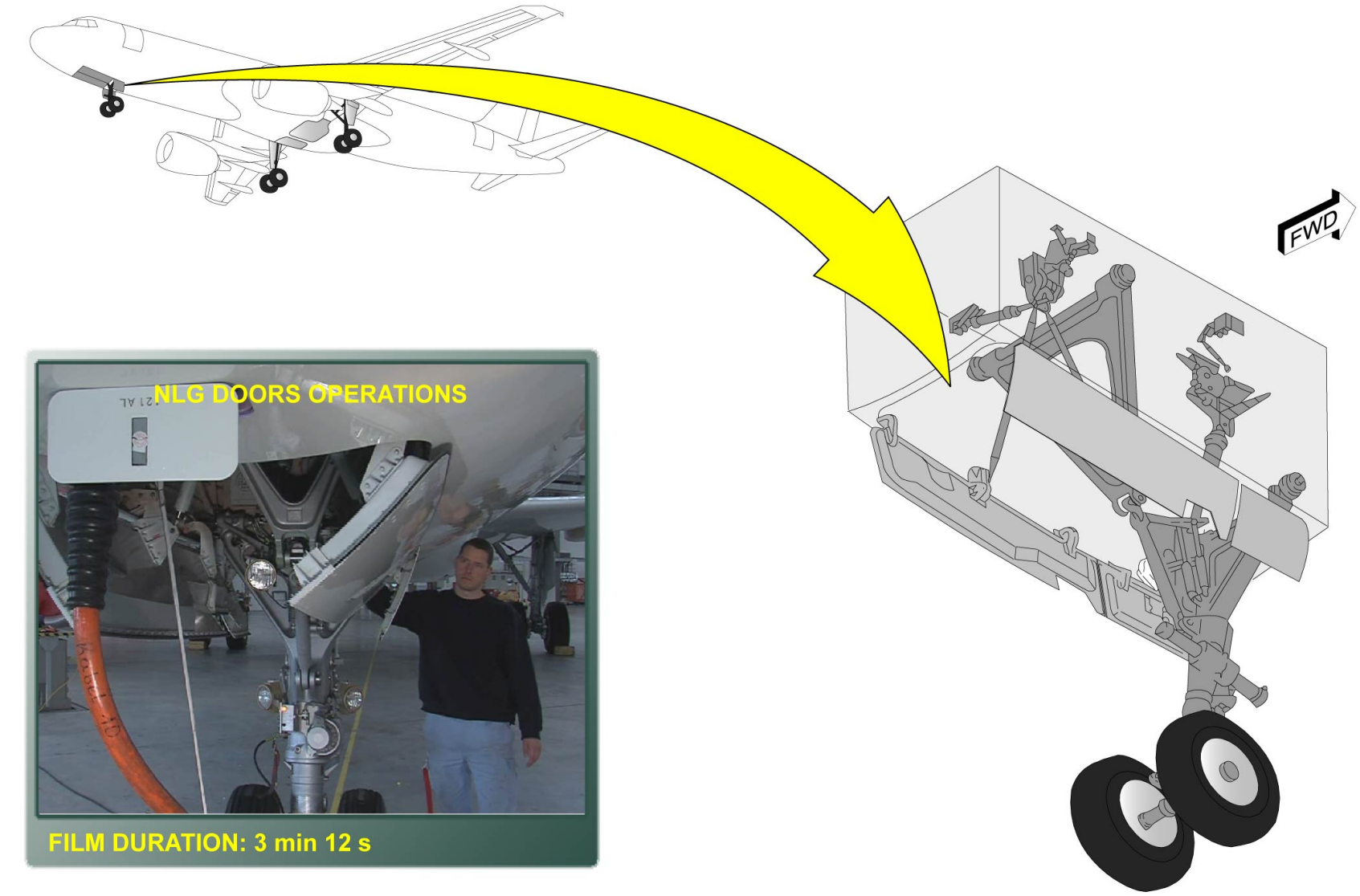


NLG DOORS GROUND OPERATION - DOORS OPENING PREPARATION ... DOORS CLOSING

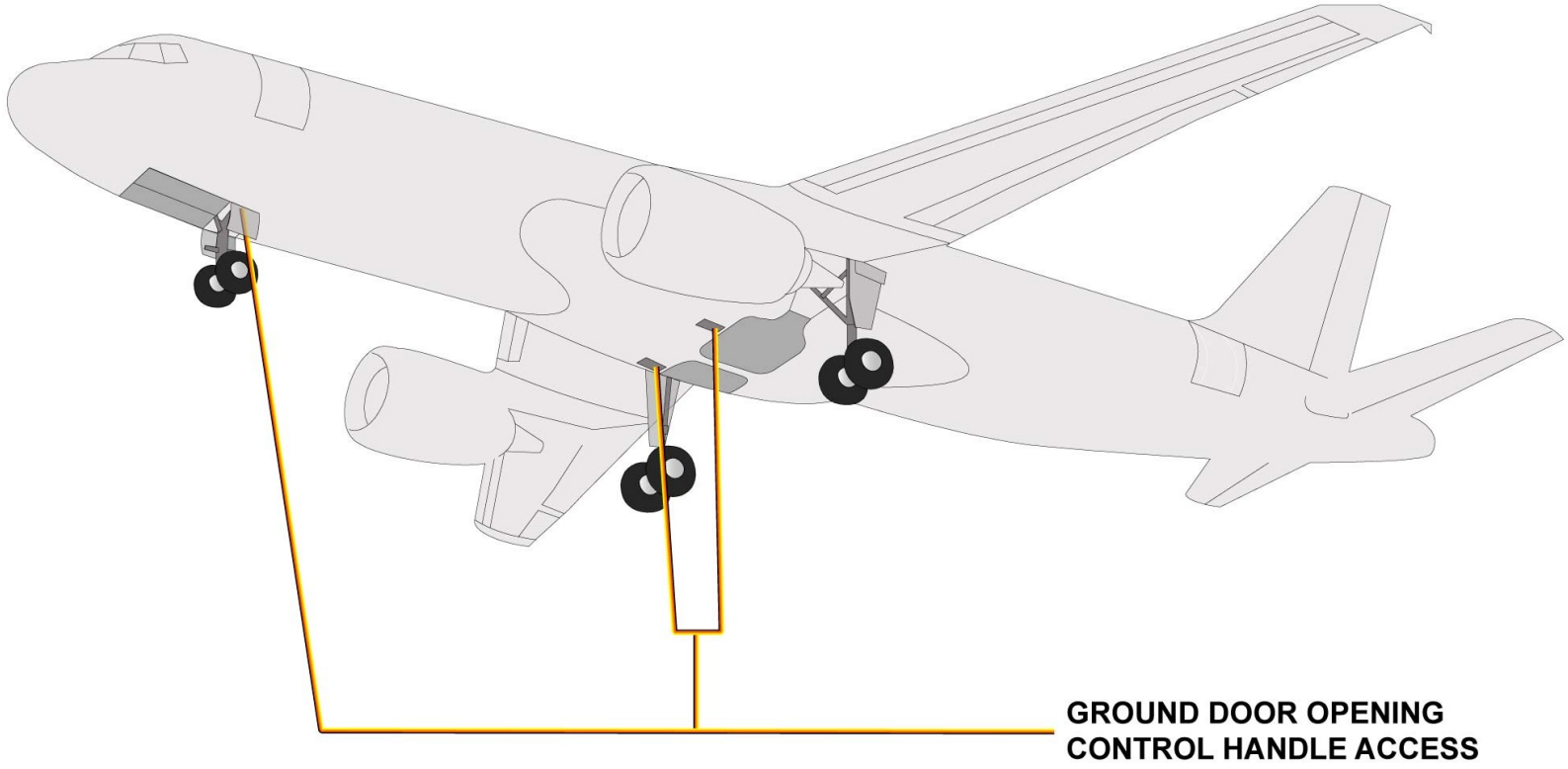
LANDING GEAR DOORS GROUND OPENING D/O (3)

GENERAL

Each main doors and nose doors have a ground door opening system that comprises these primary components:
- a ground door opening control handle,
- a mechanical transmission,
- a by-pass valve,
- a release mechanism in the door uplock.

The control handle has two lockable positions. When it is set to the "DOOR OPEN" position, it causes the mechanical system to:
- operate the door by-pass valve,
- release the door from its uplock.

This prevents a hydraulic lock, and allows the hydraulic fluid to be released from the door actuating cylinder "DOOR CLOSED" line. The door then moves by gravity.



GENERAL

LANDING GEAR DOORS GROUND OPENING D/O (3)

MAIN DOORS

The ground opening control handle is located FWD of the respective MLG bay into the hydraulic compartment. This location places the operator in a safe position with a clear view of the door travel. The handle is connected through a push-pull cable to the door by-pass valve on the outboard side of the MLG bay.

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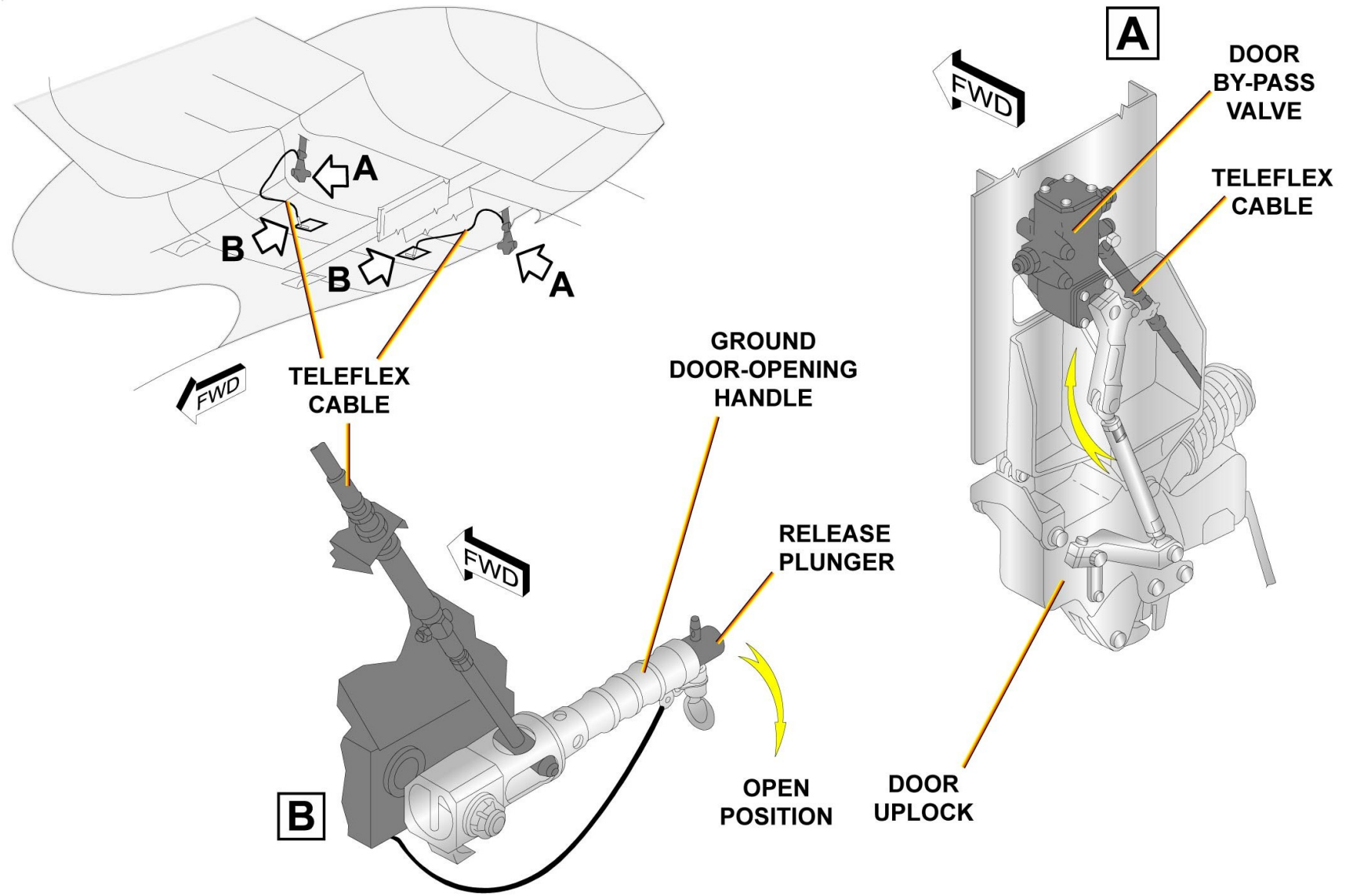
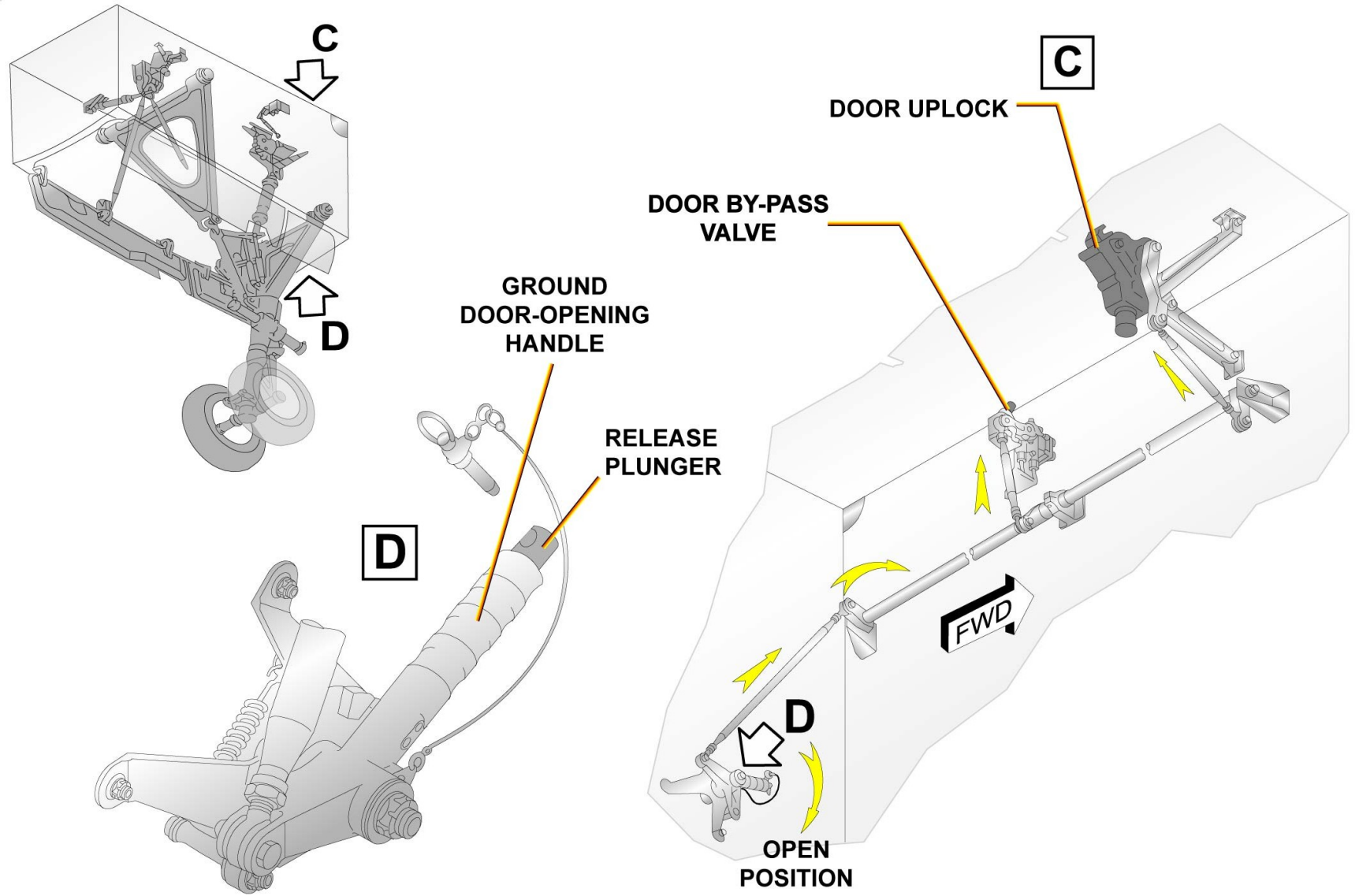

A
B
B
A
FWD
TELEFLEX
CABLE
GROUND
DOOR-OPENING
HANDLE
FWD
RELEASE
PLUNGER
B
OPEN
POSITION
A
FWD
DOOR
BY-PASS
VALVE
TELEFLEX
CABLE
DOOR
UPLOCK

MAIN DOORS

LANDING GEAR DOORS GROUND OPENING D/O (3)

NOSE DOORS

The ground opening control handle is located at the AFT wall of the Nose NLG bay. This location places the operator in a safe position with a clear view of the door travel. The handle is connected to a lay shaft on the door by-pass valve and the door uplock on the left hand side wall of the NLG bay.


C
D
C
DOOR UPLOCK
DOOR BY-PASS VALVE
GROUND DOOR-OPENING HANDLE
RELEASE PLUNGER
D
FWD
D
OPEN POSITION

NOSE DOORS

LANDING GEAR DOORS GROUND OPENING D/O (3)

HYDRAULIC OPERATION

Each by-pass valve has three hydraulic connections marked A, B and C:
- port A: door open line,
- port B: door close line from the selector valve,
- port C: door close line to the door actuating cylinder.

During normal operation of the L/G, port A is closed and port B is connected to port C allowing the respective door actuating cylinder and door uplock to be operated. When the ground door opening control handle is operated, port B is closed and port A is connected to port C. A locking plunger in the by-pass valve stops the movement of the control lever from the "DOOR OPEN" to the "DOOR CLOSED" position. Before any selection can be made, a hydraulic pressure greater than 70 bar (1015 psi) must be supplied to port B to retract the locking plunger.

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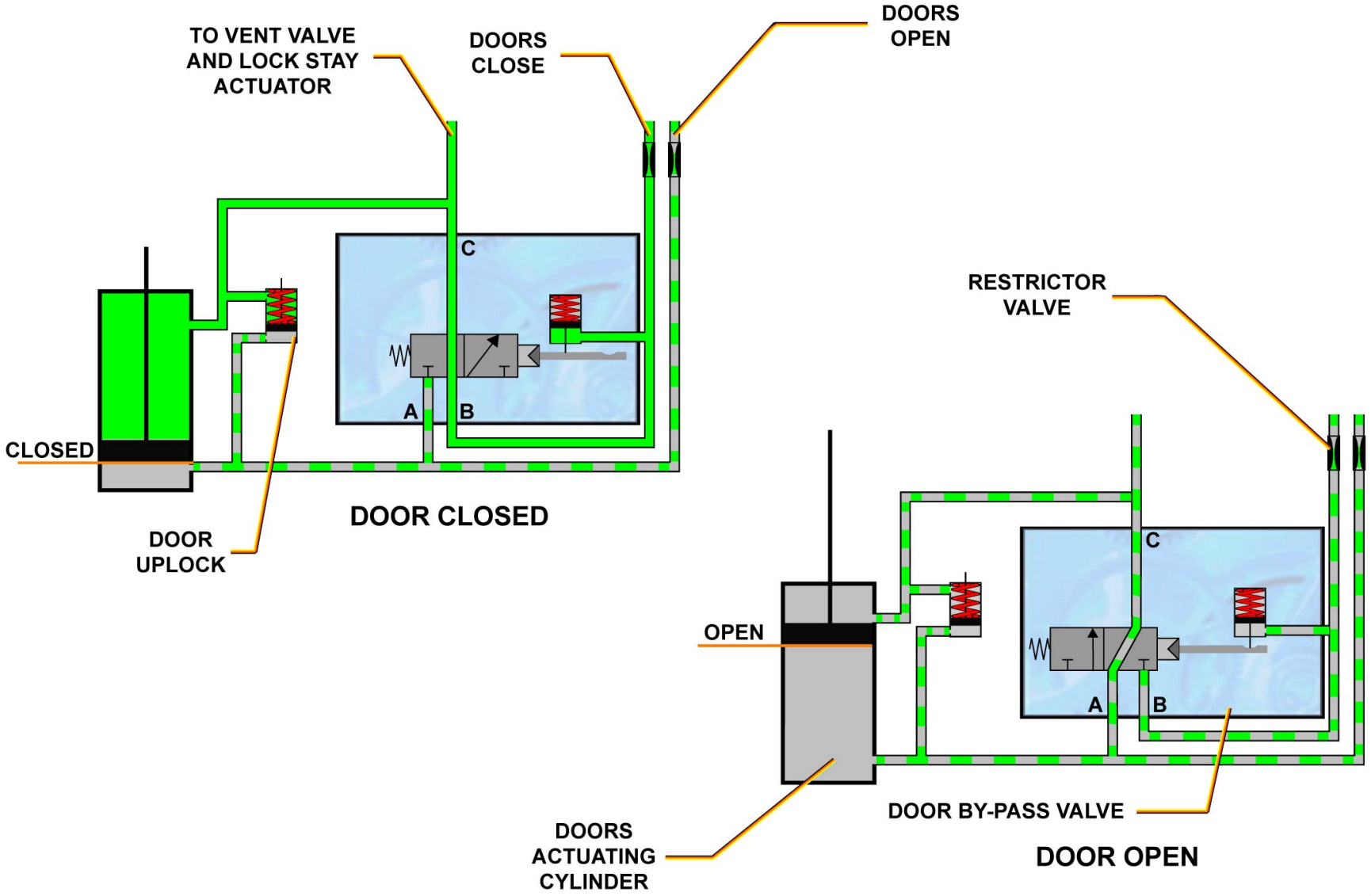

HYDRAULIC OPERATION

LGCIU CONTROL SIGNALS (3)

UP SELECTION

Two UP selection signals that come from the lever, are sent to the Landing Gear Control Interface Unit (LGCIU) to initiate the gear retraction sequence.

DOWN SELECTION

Two DOWN selection signals coming from the lever, are sent to the LGCIU to initiate the gear extension sequence.

DOOR UPLOCKS

Three door uplock signals that come from door uplock proximity detectors, are sent to the LGCIU to indicate whether doors are uplocked, or not.

DOOR FULLY OPEN

There are four door fully open signals, two of which for nose doors. These signals come from the corresponding proximity detectors and are sent to the LGCIU's to indicate whether doors are fully open, or not.

GEAR UPLOCKS

Three gear uplock signals that come from gear uplock proximity detectors, are sent to the LGCIU to indicate whether gears are uplocked, or not.

GEAR DOWNLOCKS

Three gear down lock signals that come from gear down lock proximity detectors, are sent to the LGCIU to indicate whether gears are down and locked, or not.

FULLY EXTENDED OR COMPRESSED

Three shock absorber signals, which come from the proximity detectors, are sent to the LGCIU to indicate whether shock absorbers are fully extended or compressed. Note that nose landing gear "ground" or "flight" information is given according to the shock absorber and wheel position.

DOOR SELECTOR VALVE

After analyzing all the input signals, the LGCIU sends a signal to the corresponding solenoid of the door selector valve according to the position of the gears.

GEAR SELECTOR VALVE

After analyzing all the input signals, the LGCIU sends a signal to the corresponding solenoid of the gear selector valve according to the position of the doors.

L/G BAULK SOLENOID

After analyzing all shock absorber signals, the LGCIU sends a signal to the L/G baulk solenoid to prevent gear retraction if any shock absorber is compressed or nose wheels are not centered.

LGCIU 2

The control signals for LGCIU 2 are the same. Four signals are used by the LGCIU for system selection:
- two for system 1 status,
- two for system 2 status.

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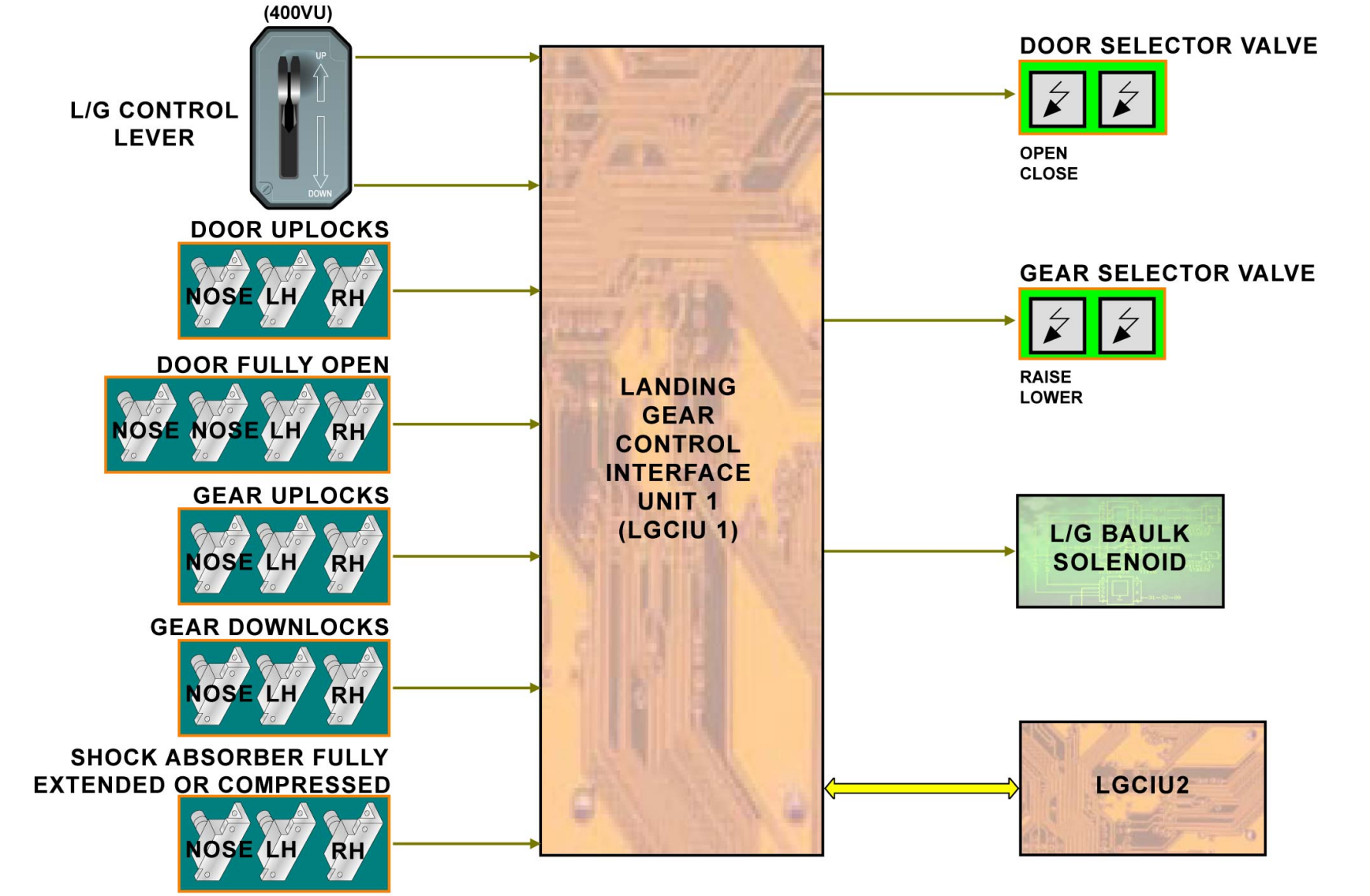
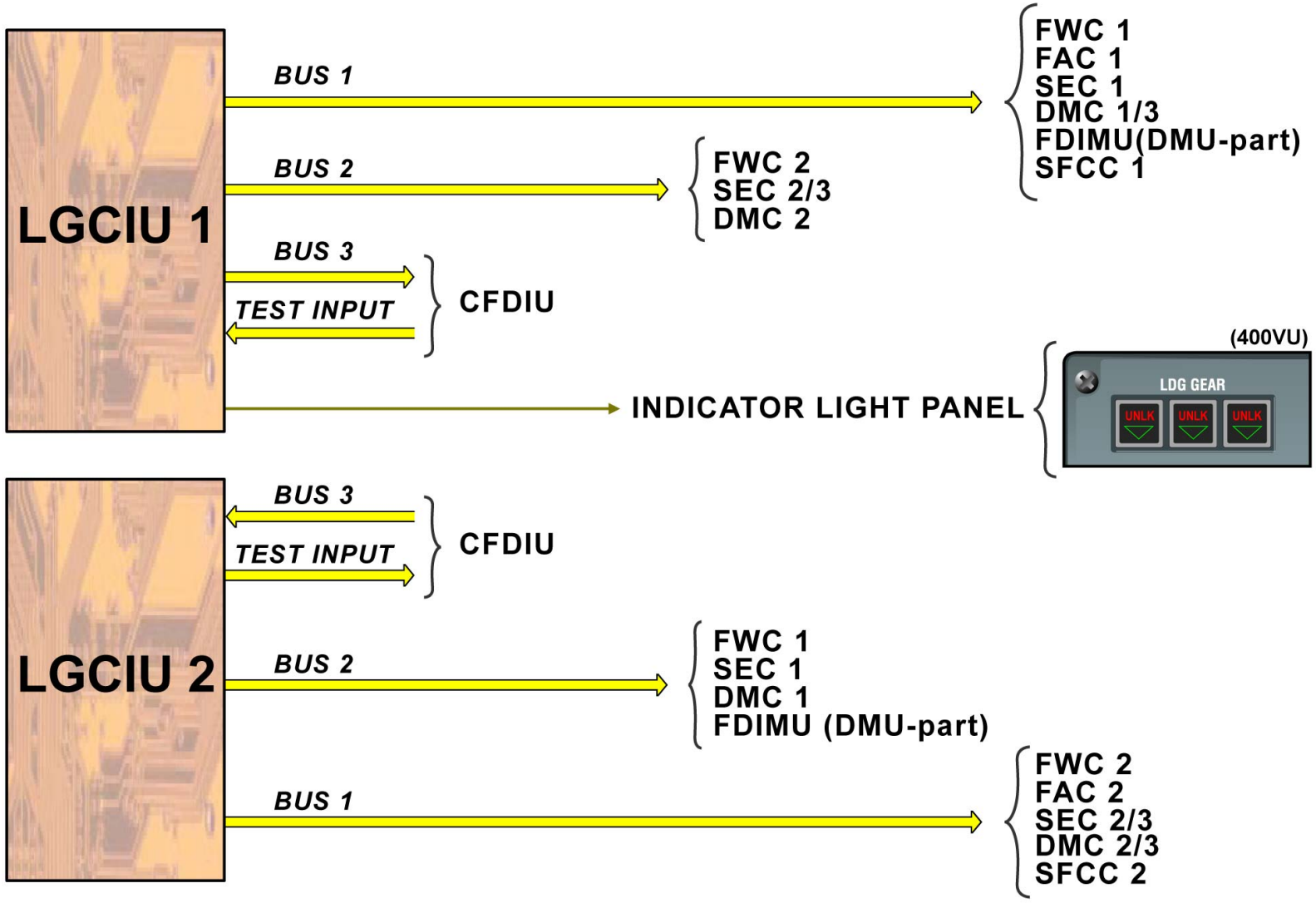


UP SELECTION ... LGCIU 2

LGCIU MONITORING INTERFACES (3)

ARINC AND INDICATOR PANEL

After analyzing gear uplock and down lock signals, the Landing Gear Control and Interface Unit (LGCIU) sends up to six signals to the corresponding lights on the L/G indicator panel.



ARINC AND INDICATOR PANEL

LGCIU MONITORING INTERFACES (3)

DISCRETE

The discrete connections are classified into four categories corresponding to the status of the L/G:
- L/G shock absorber compressed,
- L/G shock absorber fully extended,
- L/G downlocked,
- L/G uplocked/unlocked.

Discrete logic signals are given to the applicable systems when:
- the NLG shock absorber is compressed,
- the NLG shock absorber is fully extended,
- the NLG or the L/H MLG or the R/H MLG are downlocked,
- the L/H or the R/H MLGs are in a ground condition, they are applicable when the gear(s) is(are) locked down,
- the L/H or the R/H MLGs are in a flight condition.

LANDING GEAR SHOCK ABSORBER COMPRESSED

LGCUI 1	LGCUI 2	ATA	FUNCTION
M	M	2126	AVIONICS EQUIPMENT VENTILATION CONTROLLER (AEVC)
	M	2128	CARGO COMPARTMENT VENTILATION CONTROLLER
M	M	2131	CABIN PRESSURE CONTROL/MONITORING
	L R	2161	PACK TEMPERATURE CONTROL
N	N	2268	FLIGHT AUGMENTATION COMPUTER (FAC)
L R N	L R N	2269	FLIGHT AUGMENTATION COMPUTER (FAC)
N	N	2285	FLIGHT MANAGEMENT AND GUIDANCE COMPUTER (FMGC)
M	M	2344	CIDS DIRECTOR (CABIN/SERVICE INTERPHONE)
M	M	2373	CABIN INTERCOMMUNICATION DATA SYSTEM DIRECTOR
	M	2426	GALLEY SUPPLY CONTROL
N		2428	STATIC INVERTOR GENERATION
M		2438	BATTERY DC GENERATION
M	M	2612	ENG FIRE/OVERHEAT DETECTION
M	M	2613	APU FIRE/OVERHEAT DETECTION
M		2622	APU FIRE EXTINGUISHING
M	M	2751	FLAPS ELECTRICAL CONTROL AND MONITORING
M	M	2751	SLATS ELECTRICAL CONTROL AND MONITORING
L R N	L R N	2792	ELECTRICAL FLIGHT CONTROL SYSTEM (ELAC 1 & 2)
M	L R	2794	ELECTRICAL FLIGHT CONTROL SYSTEM (SEC)
N	N	2795	FLIGHT CONTROL DATA CONCENTRATOR (FCDC)
	N	2923	HYDRAULIC POWER TRANSFER UNIT
L R N	L R N	3031	PROBE HEAT COMPUTER (PHC)
		3042	WINDOW HEAT COMPUTER (WHC)
N		3132	CENTRALIZED FAULT DISPLAY INTERFACE UNIT (CFDIU)
M	M	3137	AIRCRAFT INTEGRATED DATA SYSTEM (AIDS)
L	L	3152	FLIGHT WARNING COMPUTER (FWC) ACQUISITION/INTERFACE
L	L	3154	SYSTEM DATA ACQUISITION/INTERFACE
L	L	3162	DISPLAY MANAGEMENT COMPUTER (DMC) 1, 2 AND 3
M		3231	LANDING GEAR CONTROL AND INTERFACE UNIT (LGCIU)
R	L R	3242	BRAKING & STEERING CONTROL UNIT (BSCU) (NORM BRKG)
	M	3249	TIRE PRESSURE UNIT (TPIU)
	N	3251	BRAKING & STEERING CONTROL UNIT (BSCU) (STEERING)
M	M	3262	LANDING GEAR POSITION RELAYS (11GB/12GB)
	M	3347	LOGO LIGHTS
	M	3348	ANTI COLLISION/STROBE LIGHTING
L	R	3452	AIR TRAFFIC CONTROL (ATC) 1 AND 2
	M	3831	VACUUM SYSTEM CONTROLLER (VSC)
M		4961	APU CONTROL AND MONITORING
L R	L R N	7325	FULL AUTHORITY DIGITAL ENGINE CONTROL (FADEC)

LANDING GEAR SHOCK ABSORBER FULLY EXTENDED

LGCUI 1	LGCUI 2	ATA	FUNCTION
	L	2311	HIGHT FREQUENCY (HF) 1 AND 2
L	L	2312	VERY HIGHT FREQUENCY (VHF) 1, 2 AND 3
L	L	2313	RADIO MANAGEMENT PANEL (RMP) 1, 2 AND 3
	N	2324	ACARS MANAGEMENT UNIT
M		2342	COCKPIT TO GROUND CREW CALL SYSTEM
M		2351	AUDIO MANAGEMENT UNIT (AMU)
N		2371	COCKPIT VOICE RECORDER (CVR)
N		2912	BLUE MAIN HYDRAULIC POWER
L	R	3011	WING ICE PROTECTION
N		3411	ADIRS POWER SUPPLY AND SWITCHING
L	R	3436	INSTRUMENT LANDING SYSTEM (ILS) 1 AND 2
	L	3441	RADAR 1 AND 2
L	R	3442	RADIO ALTIMETER
N		3448	GROUND PROXIMITY WARNING SYSTEM (GPWS)
L	R	3451	DISTANCE MEASURING EQUIPMENT 1 AND 2
L	R	3453	AUTOMATIC DIRECTION FINDING 1 AND 2
L	R	3455	VERY HIGHT FREQ. OMNIDIRECTIONAL RANGE 1 AND 2
L	R	5261	AIRSTAIRS

LANDING GEAR DOWNLOCKED

LGCUI 1	LGCUI 2	ATA	FUNCTION
M	M	2269	FLIGHT AUGMENTATION COMPUTER (FAC)
M	M	2344	SERVICE INTERPHONE
M	M	2373	CABIN INTERCOMMUCATION DATA SYSTEM (CIDS)
N	N	3137	AIRCRAFT INTEGRATED DATA SYSTEM (AIDS)
	N	3242	BRAKING & STEERING CONTROL UNIT (BSCU) (NORM BRKG)
	L	3248	BRAKE COOLING SYSTEM
N	N	3251	BRAKING & STEERING CONTROL UNIT (BSCU) (STEERING)
	N	3346	TAXI/TAKE OFF LIGHTS
L		3448	GROUND PROXIMITY WARNING SYSTEM (GPWS)

LANDING GEAR UNLOCK UPLOCKED

LGCUI 1	LGCUI 2	ATA	FUNCTION
N		2462	DC ESSENTIAL DISTRIBUTION

M : MAIN GEAR L : LEFT HAND GEAR R : RIGHT HAND GEAR N : NOSE GEAR

DISCRETE

BRAKE SYSTEM DESCRIPTION (3)

B2 SCOPE

CAUTION: MODULE TAGGED B2 SCOPE.
BE AWARE THAT ONLY AVIONICS/ELECTRICAL TOPICS SHOULD BE LEARNED FOR A T2 COURSE.

PEDALS

The pedals give mechanical inputs to the normal brake pedal Transmitter (XMTR) unit, and to the alternate pedal XMTR unit for manual normal braking and alternate braking.

BRAKE PEDALS XMTR UNITS

The brake pedal XMTR units transform the mechanical input from the right and left pedals into electrical signals which are sent to the Braking and Steering Control Unit (BSCU) in normal braking and to the Alternate Braking Control Unit (ABCU) in alternate braking.

BSCU

The BSCU controls normal braking, auto braking as well as anti-skid operation during normal and alternate braking.

SELECTOR VALVE

The selector valve is an on/off valve. When normal braking is applied, the BSCU first energizes the selector valve, this lets full green pressure supply the normal servovalves.

NORMAL SERVOVALVES

The normal servovalve has a dual function: it regulates braking pressure, which depends on BSCU braking orders, and anti-skid control pressure delivered to the brakes. This servovalve with direct control laws is fully closed when there is no braking order. They are located on the MLG strut.

ABCU

The ABCU controls and monitors the alternate braking system with and without anti-skid protection.
The ABCU is automatically activated if:
- the anti-skid is faulty,
- the A/SKID switch is selected to OFF (BSCU OFF)
- the BSCU is not serviceable (both system 1 & 2 have failed),
- the normal braking has failed,
- the pressure downstream the selector valve drops below a given threshold,
- only the batteries supply the A/C.

LANDING GEAR PANEL

A landing gear panel is composed of a toggle switch for anti-skid and nose wheel steering function inhibition. There are also three P/BSWs for AUTO-BRAKE selection. The BSCU and ABCU receive inputs from the landing gear panel.

TRIPLE INDICATOR

A triple indicator gives pressure indication. The top needle supplies the alternate breaking accumulator supply pressure. The bottom needles supply pressure sent to the left and right brakes units (indication available only if ALTERNATE BRAKING is active or PARKING BRAKE is set to on).

WHEELS

Each main wheel has multidisc carbon brakes. Each main wheel rotation speed given by a tachometer is sent to the BSCU for anti-skid computation.

SHUTTLE VALVES

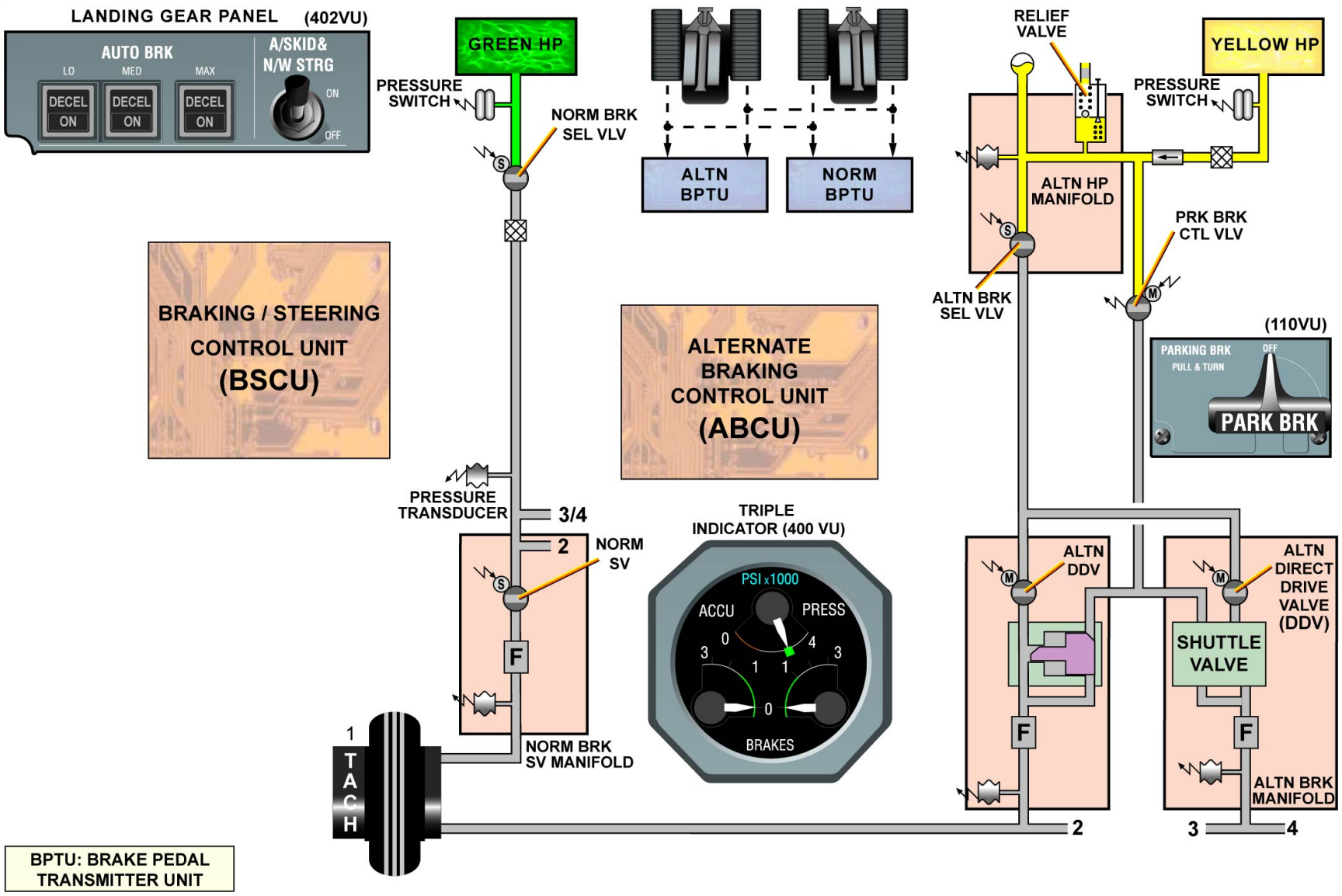
The shuttle valves give the hydraulic priority for brake supply to the parking brake.

PARKING BRAKE CONTROL VALVE

The parking brake electrical control valve is operated by the parking brake handle. When it is open, a signal is sent to the BSCU and the ABCU in order to override all other braking modes.
If the normal braking system is available and, if the pedals are depressed when the PARK BRK is ON and the pressure commanded by the pedal deflection exceeds the pressure delivered by the park brake system, the normal system will send a complement of pressure to the normal set of pistons to reach the commanded value.

ACCUMULATOR

The brake accumulator is supplied from the yellow hydraulic system and can provide pressure to the alternate brake system.



B2 SCOPE ... ACCUMULATOR

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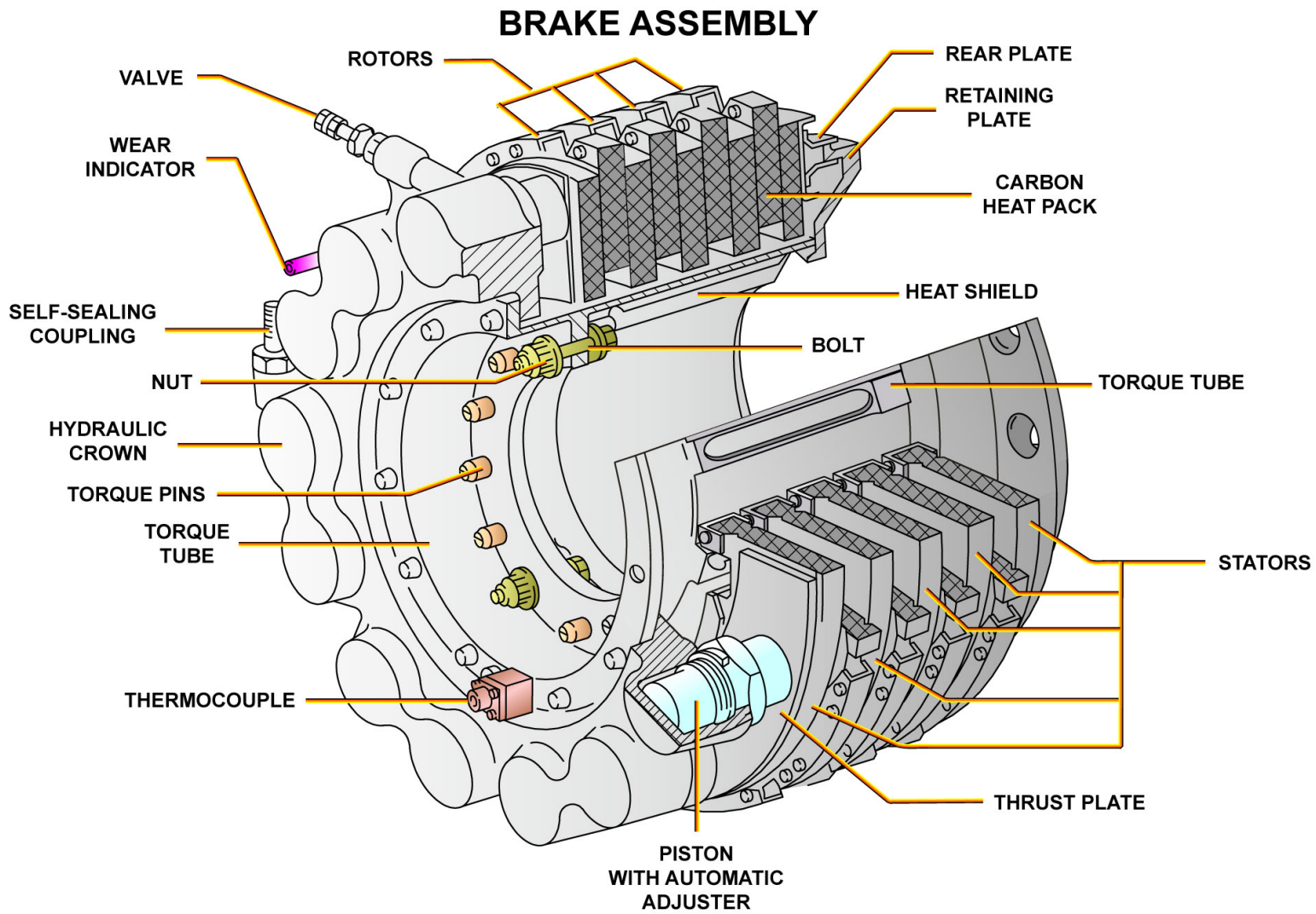
BRAKE SYSTEM DESCRIPTION (3)

BRAKE ASSEMBLY

There are different available brake assemblies. A typical brake assembly includes a piston housing and a carbon heat pack.
The piston housing has:
- 2 hydraulically independent sets of pistons (normal and alternate),
- a piston set that has 5 or 7 pistons (in relation to the brake unit version),
- a bleeder for each of the two systems,
- a self-sealing coupling for each system,
- a torque tube,
- two wear indicators for the heat pack,
- a brake temperature sensor.

Three bolts and nine pins attach the brake to the axle flange of the landing gear.



BRAKE ASSEMBLY

AUTO-BRAKE SYSTEM D/O (3)

AUTOBRAKE MODES

The AUTO BRaKe panel is used to select the desired deceleration rate of the system. MAXimum mode is normally selected for take-off: in the event of an aborted take-off, maximum braking pressure is sent to the normal brake pistons as soon as ground spoilers deployment order is present. MEDium or LOw modes are selected for landing: progressive pressure is sent to the brakes, for respectively 2 or 4 seconds after the ground spoilers deployment order.

ADIRS

The Air Data Inertial Reference System (ADIRS) signals the aircraft deceleration rate to the Braking and Steering Control Unit (BSCU) to be compared with the selected deceleration mode for braking computation.

A/SKID & N/W STRG SWITCH

The A/SKID & N/W STRG switch activates the anti-skid system and enables autobrake arming.
ON: anti-skid (A/SKID) and nose wheel steering (N/W STRG) are available and autobrake can be armed provided the green pressure is valid. If green pressure drops:
- yellow pressure takes over automatically, anti-skid is available, nose wheel steering is still available,
- and autobrake cannot be armed.

OFF: anti-skid, nose wheel steering, normal brake and autobrake are lost.

ARMING

The autobrake system is armed if one of the three modes P/B (LO, MED or MAX) is pressed in and the following conditions are met:
- green pressure available,
- BSCU electrically powered,
- no failure in the normal braking system.

The ON light comes on blue when the corresponding rate is armed.

ACTIVATION

The automatic braking system is activated by at least 2 of the 3 ground spoiler extension signals coming from the Spoiler Elevator Computers (SECs). The DECEL light comes on green when actual aircraft deceleration is 80 % of the selected rate (LO and MED modes) or 0.27 g (MAX mode).

DISARMING

The autobrake is disarmed by:
- releasing the selected P/B out,
- loss of one or more arming conditions,
- applying sufficient force to the pedals when autobrake is operating,
- ground spoilers retraction. If ground spoilers are extended again, autobrake will be activated as well.

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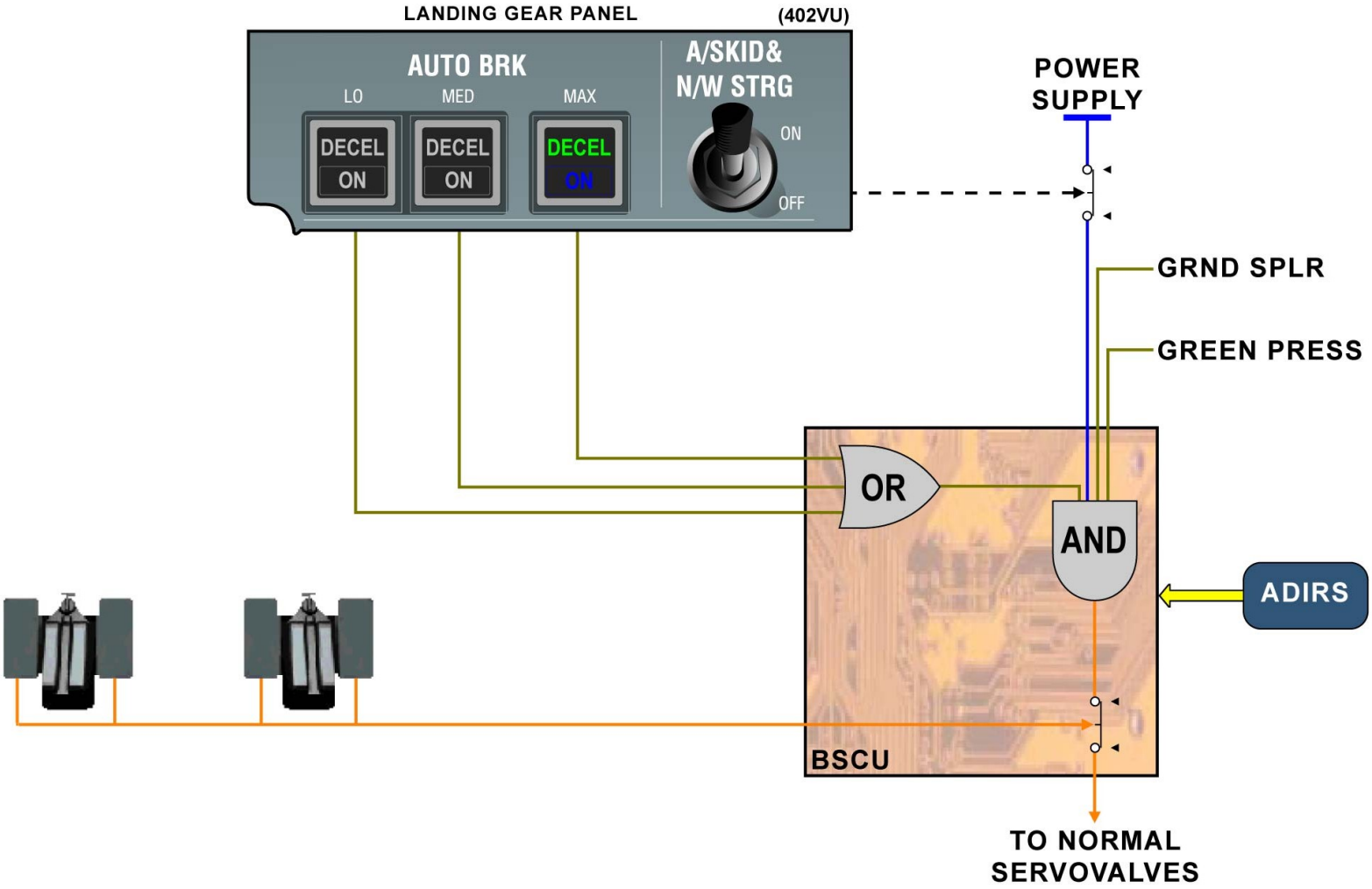

AUTOBRAKE MODES ... DISARMING

ANTI-SKID FUNCTION (3)

PURPOSE

The Anti-Skid (A/SKID) system gives the maximum braking efficiency as it keeps each individual wheel at the maximum deceleration rate avoiding a skidding configuration.

BSCU

The Braking and Steering Control Unit (BSCU) gives the A/SKID control during normal and alternate braking by either system 1 or 2 of the BSCU. Systems 1 and 2 have independent power supplies, and at each power up, the first system supplied takes control. If the two systems are supplied simultaneously. System 1 has priority and system 2 is in standby. System on standby will take control when L/G control lever is placed in the DOWN position.

PRINCIPLE

The speed of each main gear wheel, given by a tachometer, is compared with the A/C speed supplied by the Air Data Inertial Reference Units (ADIRUs). A reference speed is determined by the BSCU from the longitudinal deceleration given by ADIRUs 1, 2 or 3. When the speed of a wheel decreases below 0.87 times the reference speed, brake release orders are given to that wheel to maintain the wheel deceleration rate at that value.

REGULATION

The operational amplifier compares the calculated reference speed with the speed of the decelerating wheel. The operational amplifier supplies numerical values which are converted into current to supply the coil of the normal Servovalve (SV) and sends it to the Alternate Braking Control Unit (ABCU).

ABCU

The Alternate Braking Control Unit (ABCU) controls the alternate braking components during alternate braking with or without A/SKID.
The ABCU determines the braking orders according to the brake pedal deflections measured by the Brake Pedal Transmitter Unit (BPTU).
The ABCU combines these braking orders with the antiskid orders sent by BSCU. The ABCU send the braking orders, combined or not with antiskid control orders, to the alternate brake DDVs.

SV AND DDV

The normal SV is connected to the BSCU. The two coils of the normal SV are connected to systems 1 and 2 respectively.
The alternate DDV is connected to the ABCU which controls it.

ADIRU

The required reference speed during braking is directly obtained from the average between the values from the three ADIRUs. In case the ADIRU data is not valid, the reference speed is equal to the maximum of either MLG wheel speeds. A/C deceleration is limited to 1.7 m/s^2 (5.6 ft/s^2).

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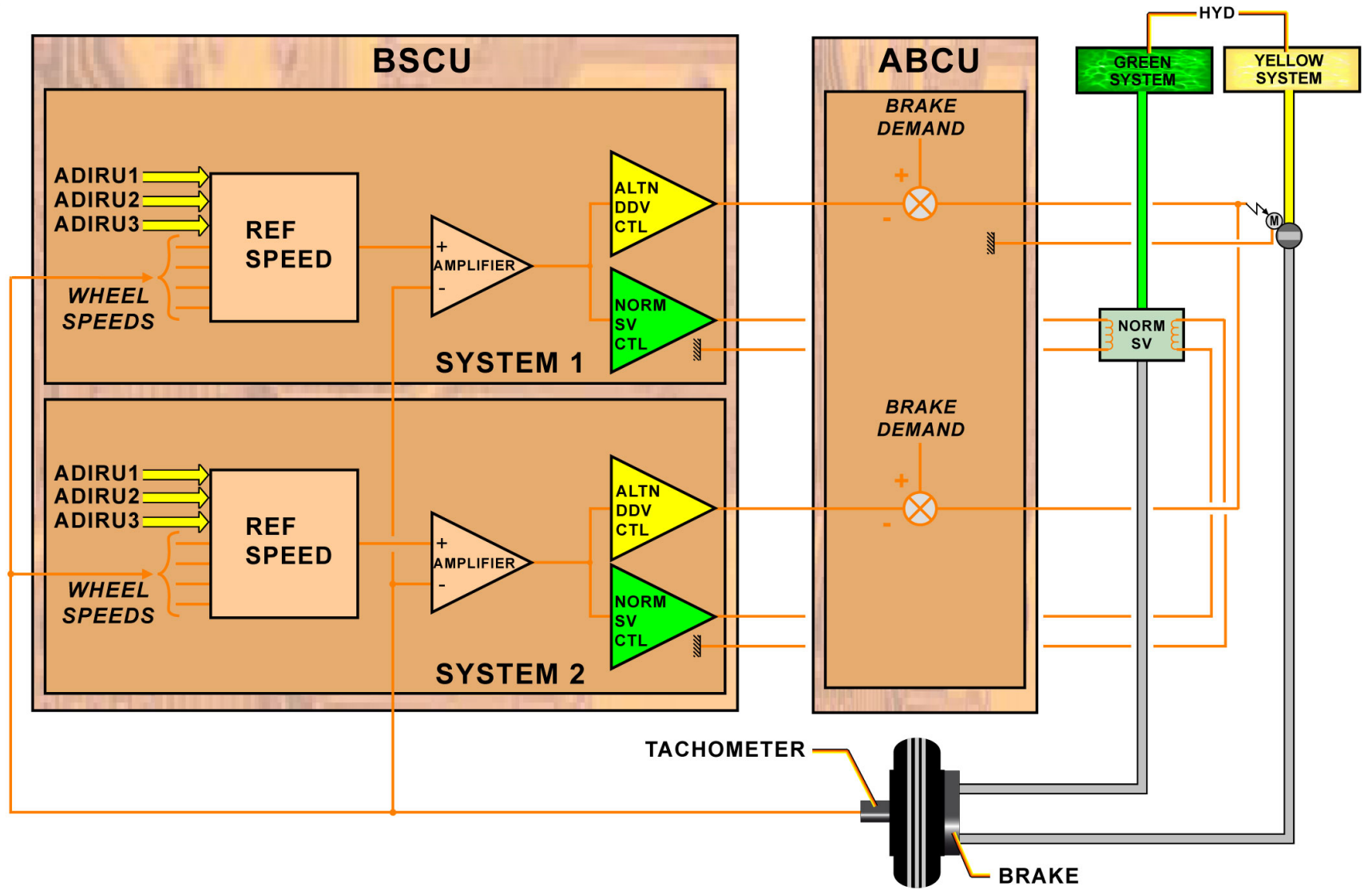


PURPOSE ... ADIRU

BRAKE SYSTEM OPERATION (3)

GENERAL

The hydraulic braking architecture is shown with all components.

NOTE: Note that only their main functions are shown.

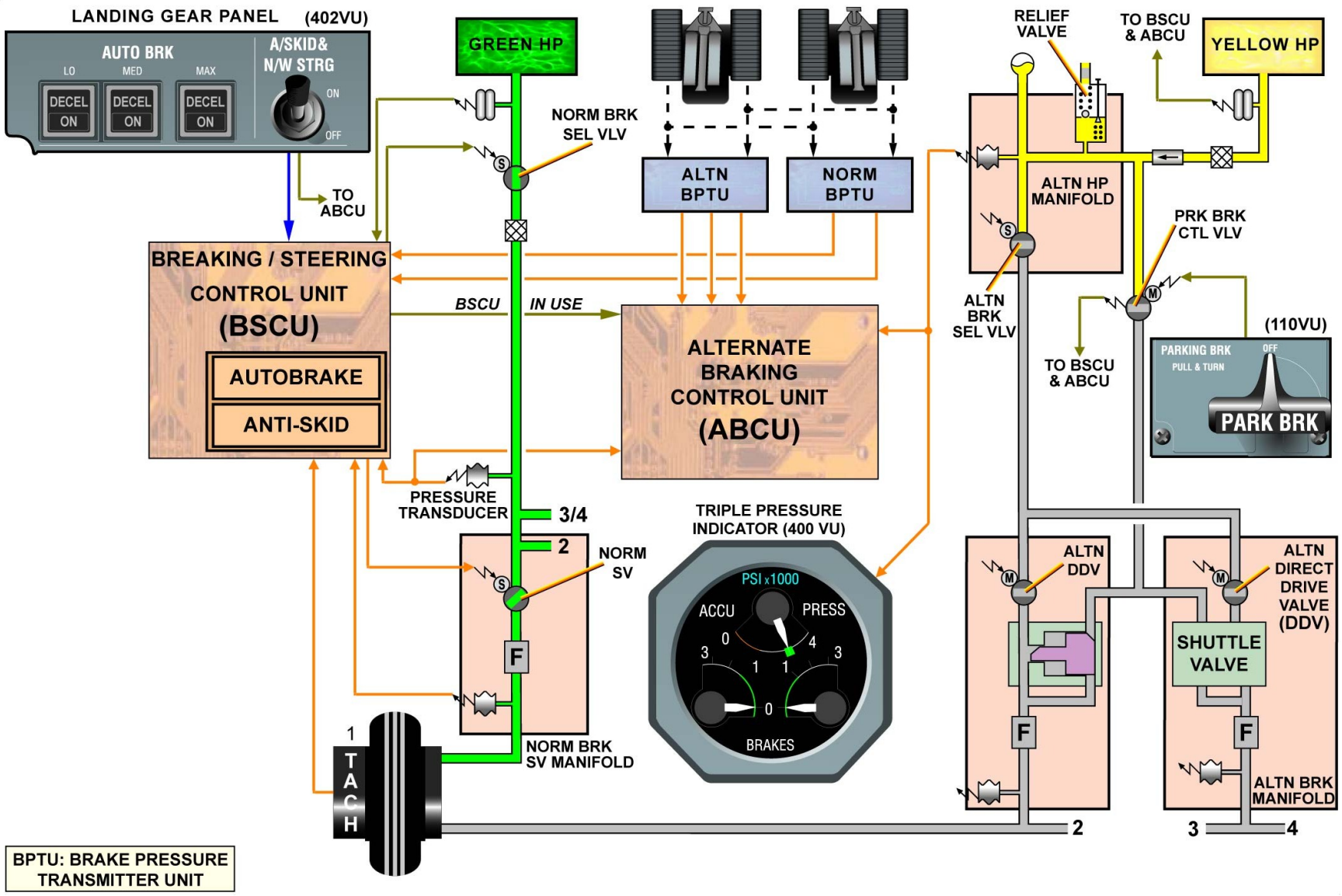
NORMAL BRAKING

The hydraulic braking operation is identical for automatic braking, manual braking and in-flight braking.

NOTE: Note that during in-flight braking, Anti-Skid (A/SKID) function is inhibited by the Braking and Steering Control Unit (BSCU).

Normal braking and A/SKID regulations are electrically controlled by the BSCU.

OPERATION: The selector valve is energized. The normal brake servovalves supply a pressure which depends on the control current delivered by the BSCU. The manifold comprises the servovalves, the pressure transducers and the hydraulic fuses. The hydraulic fuses stop the flow in the lines in case of leakage. During manual braking, the brake pedal transmitter units provide an artificial feel at the pedals. The artifical feel at the pedals is provided by means of 2 sets of spring rods, that are as well putting the pedals to its initial position when the force is removed. A pressure transducer downstream of the normal brake selector valve sends the hydraulic pressure information to the BSCU and the ALTN Braking Control Unit (ABCU). A pressure lower than 90 bar or all other normal braking failure lets the ABCU activate the ALTN braking mode.



GENERAL & NORMAL BRAKING

BRAKE SYSTEM OPERATION (3)

ALTN BRAKING WITH A/SKID

The ALTN braking with A/SKID is electrically controlled and hydraulically operated. The yellow High Pressure (HP) system supplies the ALTN braking. A pressure transducer informs the ABCU in case of yellow LP. When the normal braking is faulty or the pressure downstream the normal selector valve drops, the BSCU informs the ABCU, which becomes active.

OPERATION: The orders are entered through the pedals and an ALTN brake pedal transmitter unit transmits the orders to the ABCU. The ABCU opens the ALTN brake selector valve. The current sent to the Direct Drive Valves (DDVs) is proportional to the pressure applied on the brake pedals. The pressure output from each DDV goes through its related shuttle valve and the hydraulic fuse. Each ALTN brake manifold comprises one alternate DDV and one hydraulic fuse. One ALTN brake pressure transducer is installed at each alternate brake manifold, downstream of the hydraulic fuse. They transmit brake pressure data to the ACCU/PRESS triple indicator to ABCU and the BSCU. The BSCU uses it for the A/SKID function. If a wheel starts to skid, the BSCU sends a signal to the ABCU to reduce the current in the related DDV. The hydraulic fuse stops the flow in the line in case of leakage.

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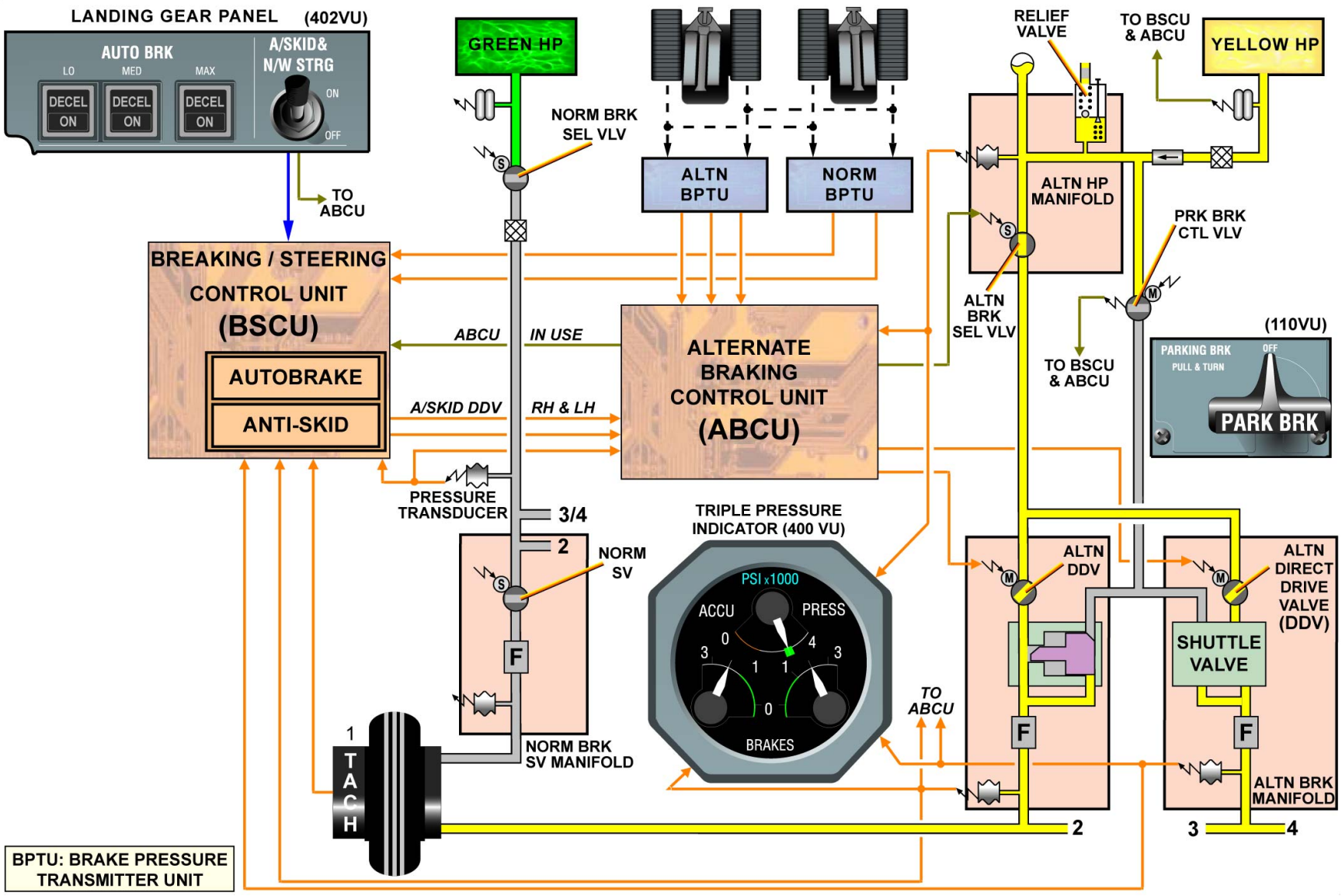
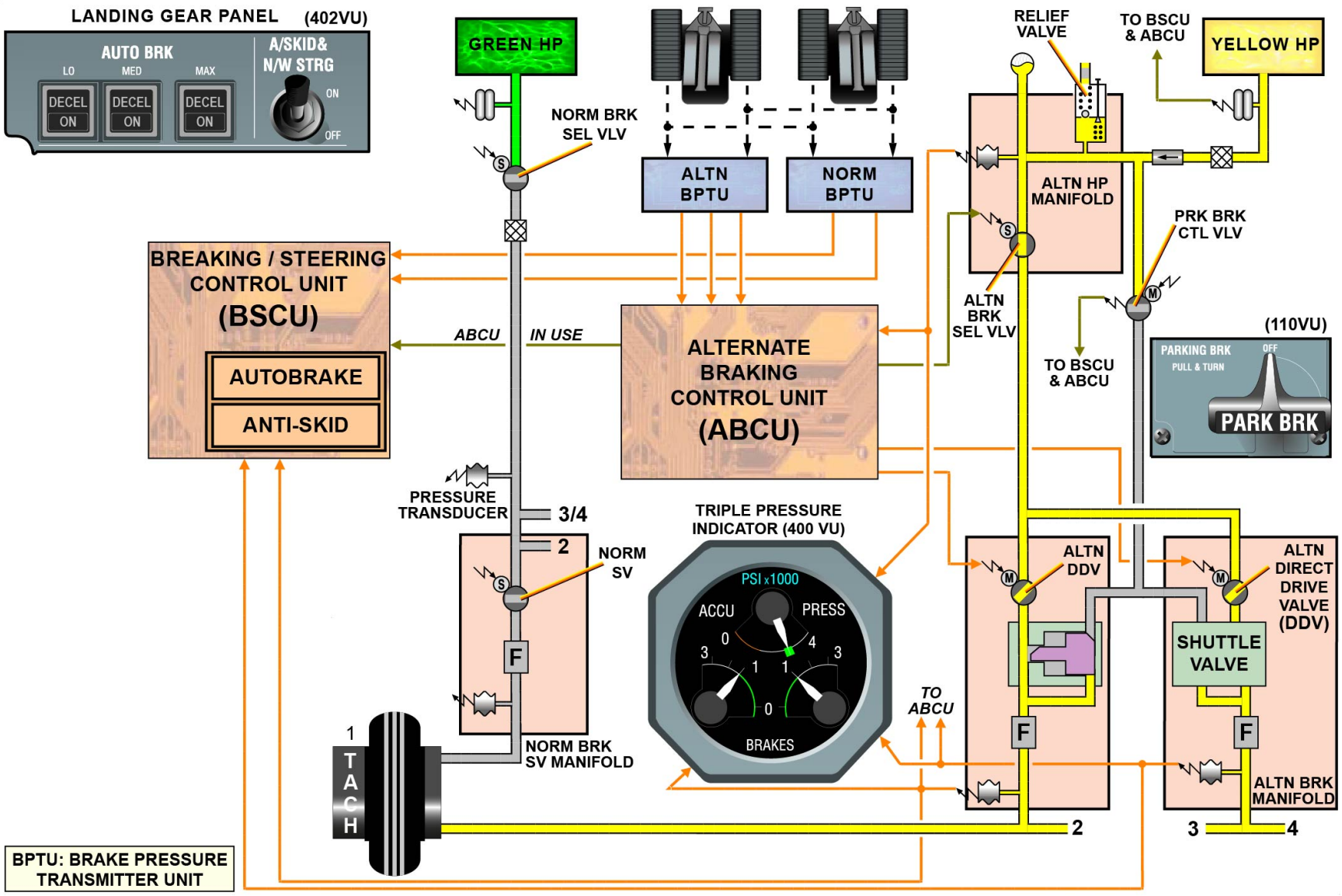


ALTN BRAKING WITH A/SKID

BRAKE SYSTEM OPERATION (3)

ALTN BRAKING WITHOUT A/SKID

In case of A/SKID failure during the ALTN braking with A/SKID, the ABCU automatically controls the ALTN braking system without A/SKID protection. Moreover, in the event of insufficient yellow hydraulic pressure, the brake accumulator supplies the brakes (emergency braking). Thus, the ABCU inhibits the antiskid protection and maintains a predetermined level of braking even when the brake pedals are fully released. This is to prevent the loss of hydraulic fluid from the accumulator.
OPERATION: braking orders are sent to the ABCU via the ALTN brake pedal transmitter unit. The ABCU energizes the ALTN brake selector valve and applies to the DDV a current proportional to the ALTN brake pedal transmitter unit signals. To reduce the risk of tire burst when A/SKID is not available, the ABCU limits the brake pressure to 1000 psi (70 bar). To release this limitation, the ALTN brake pressure transducers measure the brake pressure and send this data to the ABCU. These transducers give visual indication on the yellow ACCU/PRESS triple indicator. A third set of potentiometers in the ALTN brake pedal transmitter unit supplied by the HOT BATTERY BUS lets the ABCU brake the A/C during towing operation.



ALTN BRAKING WITHOUT A/SKID

BRAKE SYSTEM OPERATION (3)

PARKING BRAKE/ULTIMATE EMERGENCY BRAKING

The brakes are supplied either by the yellow HP manifold or the brake accumulator.
OPERATION: When the parking brake handle is set to the "ON" position, the shuttle valves give the hydraulic priority for the brake supply to the parking brake. When the parking brake control valve is open, a signal is sent to the BSCU and the ABCU in order to override all other braking modes.
If the brake accumulator pressure becomes low when the parking brake is on, normal braking using the pedals can be applied to stop the A/C. When the pedal deflection order exceeds the pressure delivered by the parking brake, the BSCU sends a complement of pressure to the normal set of pistons to reach the commanded value.

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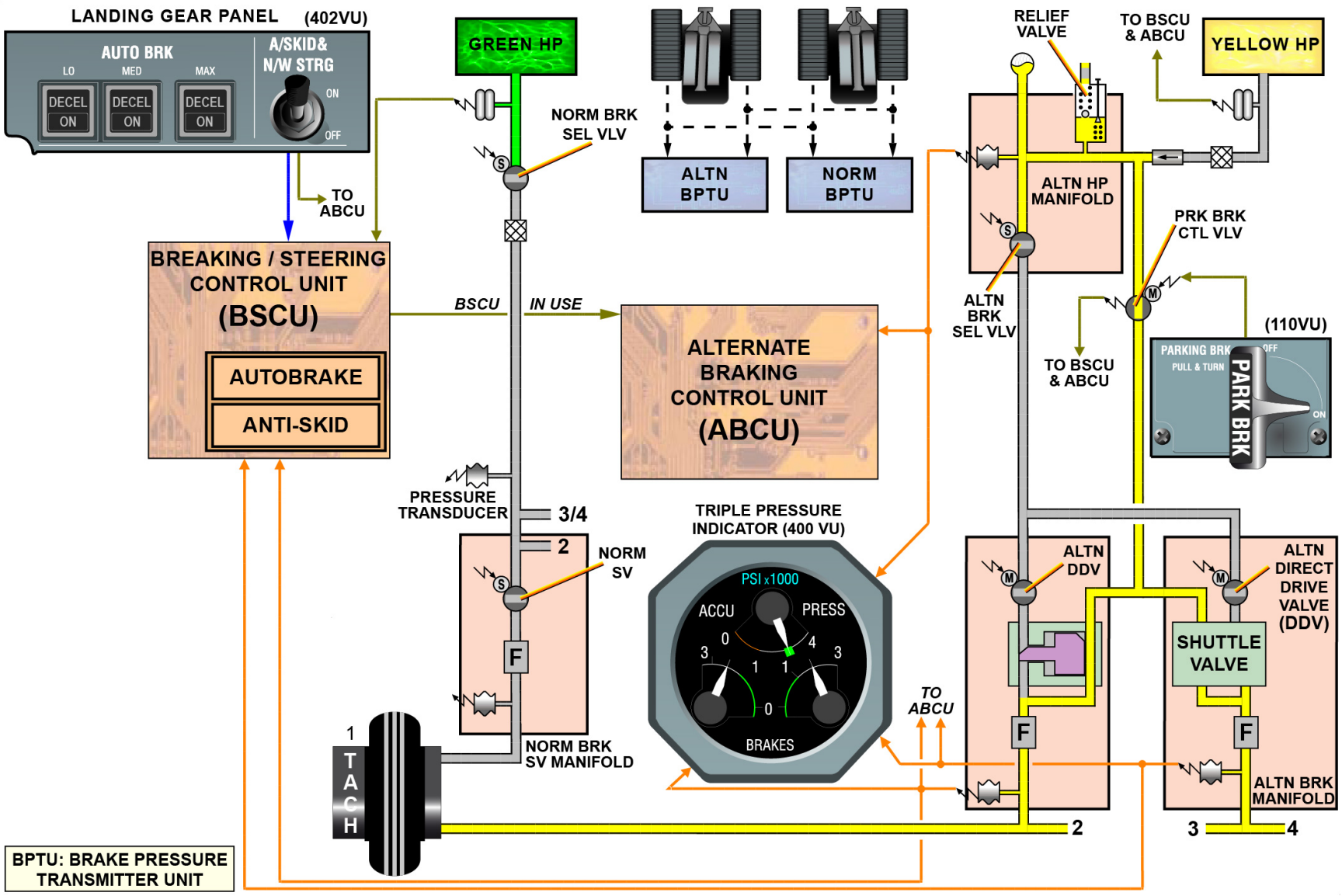


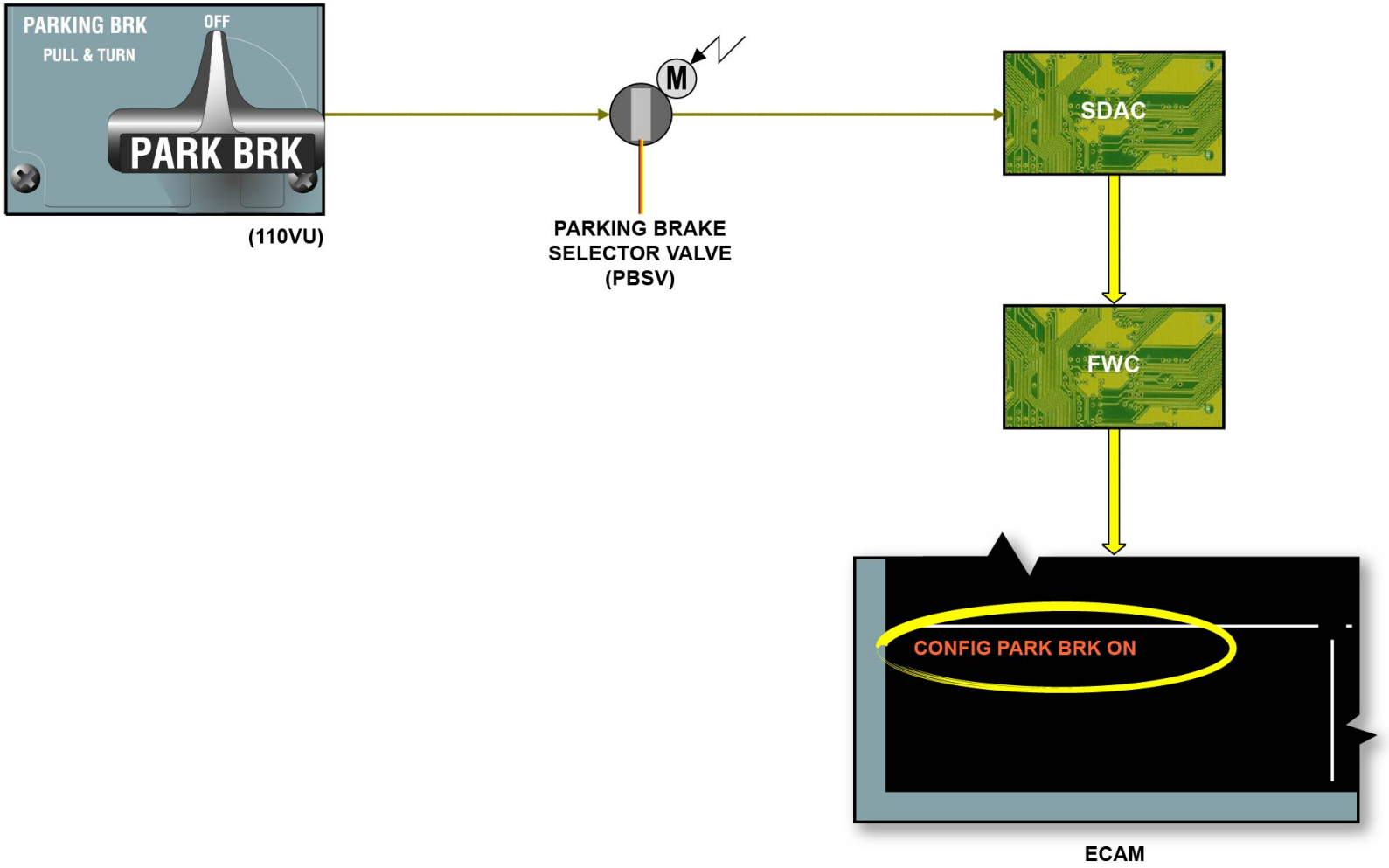
PARKING BRAKE/ULTIMATE EMERGENCY BRAKING

UGB13131 - U7ST0M0 - UM32DK000000001

BRAKE SYSTEM OPERATION (3)

PARKING BRAKE MONITORING

The parking brake monitoring function is used to detect a difference between the position of the parking brake handle and the condition of the Parking Brake Selector Valve (PBSV) and to prevent a Rejected Take Off (RTO).
If there is a PBSV failure, a message is displayed on the ECAM.



PARKING BRAKE MONITORING

BRAKE TEMPERATURE SYSTEM D/O (3)

PURPOSE

The system measures the brake temperature and indicates the values on the lower ECAM display unit. A warning is generated when the brake temperature threshold is exceeded.

TEMPERATURE SENSOR

Brake temperature is measured by one chromel-alumel thermocouple per brake.

BTMU

The Brake Temperature Monitoring Unit (BTMU) is equipped with two printed circuits to process the data from the thermocouples. After processing, the BTMU delivers a voltage which varies between 1V and 9V corresponding to a temperature range of 0 to 1000°C.

BSCU

The Braking and Steering Control Unit (BSCU) changes analog signals from the monitoring unit into digital signals for temperature indication on the lower ECAM display unit. The amber HOT light on the optional BRaKe FAN P/B comes on when the temperature threshold of any brake is reached.

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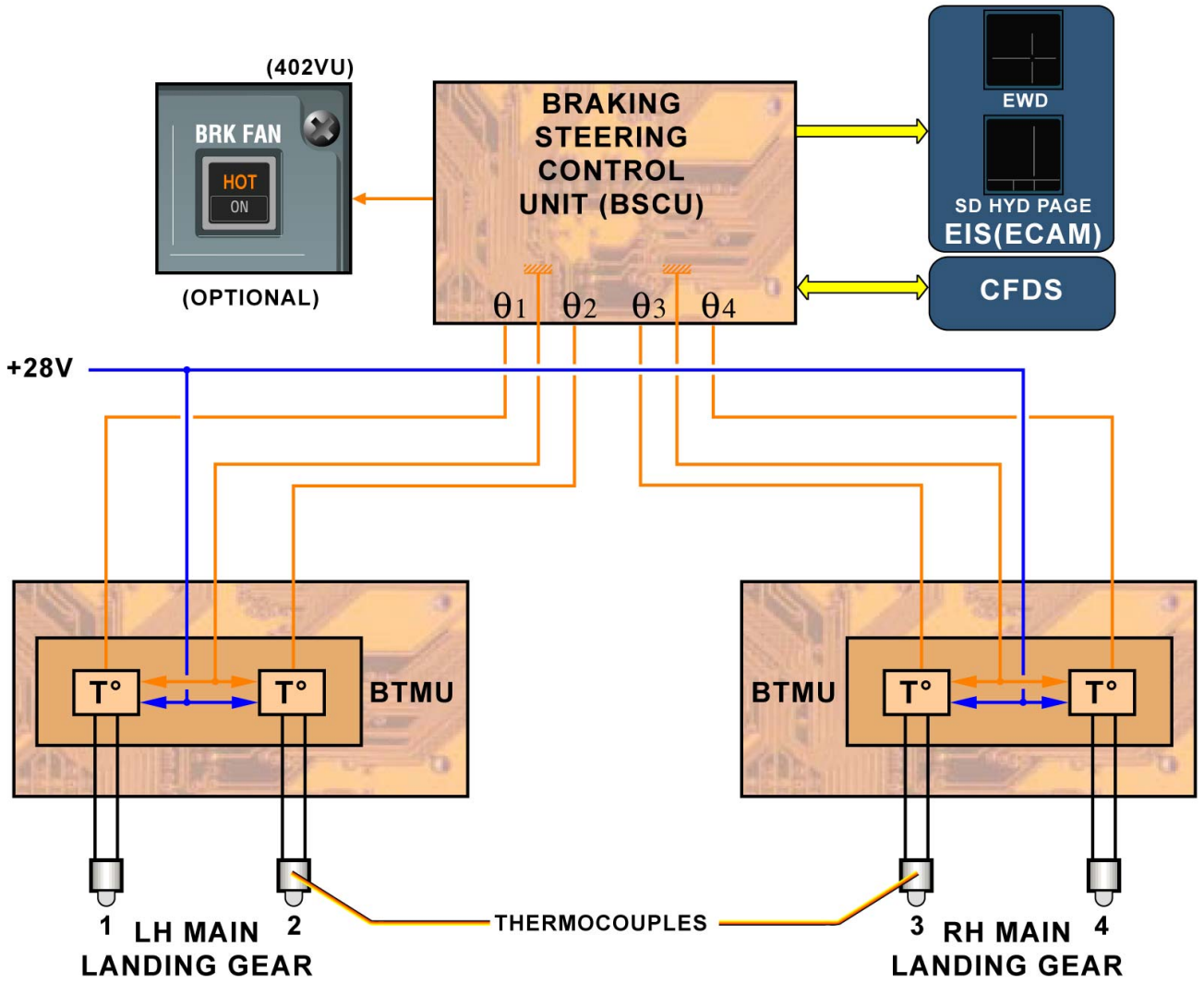


BTMU : Brake Temperature Monitoring Unit

PURPOSE ... BSCU

BRAKE COOLING SYSTEM D/O (OPTION) (3)

PURPOSE

The brake fan system lets the brakes be cooled in a short time period.

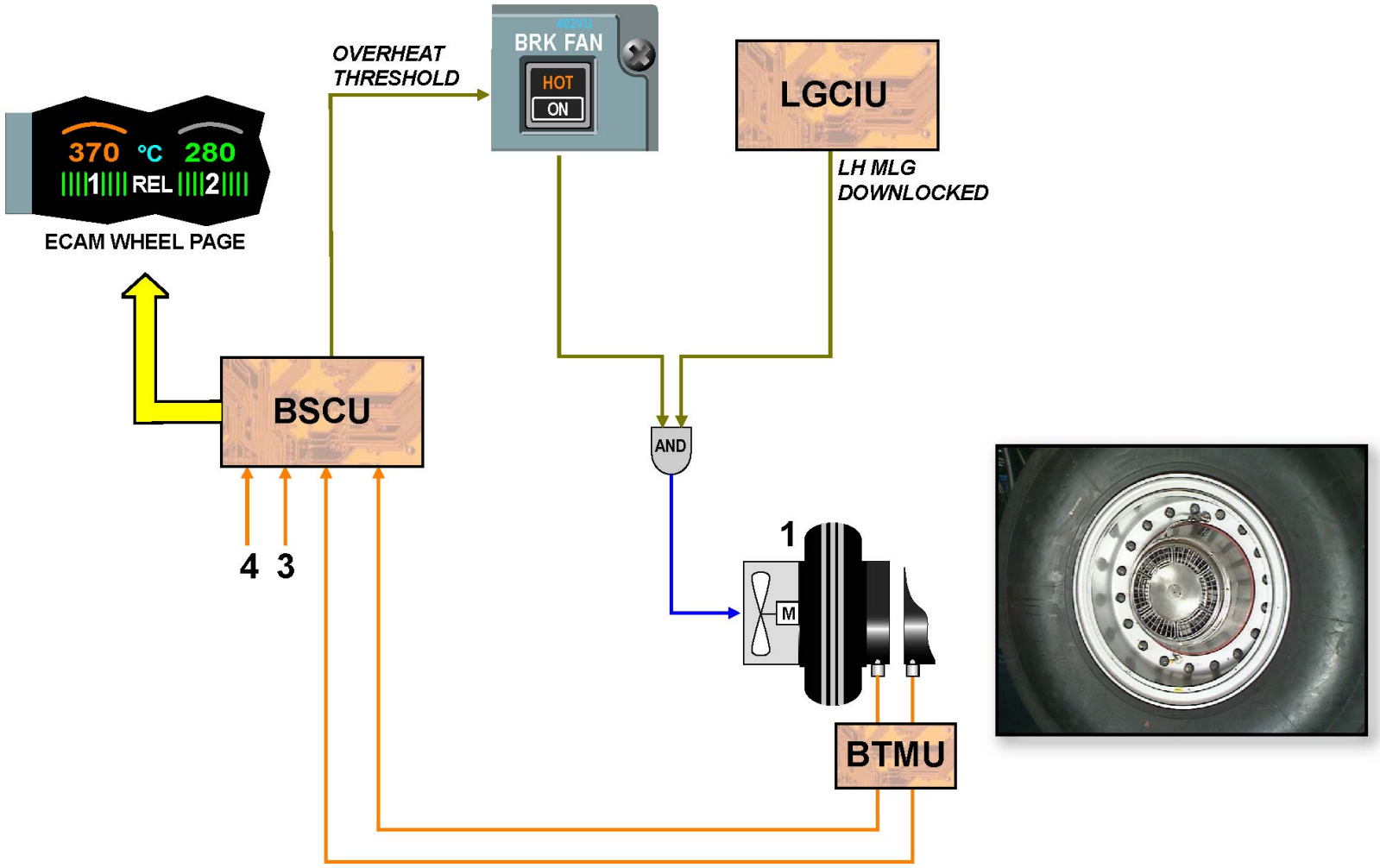
CONTROL AND LOGIC

The BRK FAN pushbutton is used to operate the fan when the landing gear is downlocked.

BRAKE FANS

The impeller creates a flow of air from the heat pack to the exterior through the debris guard. Each fan includes a three-phase type motor, an impeller and a shroud with a debris guard.

UGB13131 - U7ST0M0 - UM32D8000000002



PURPOSE ... BRAKE FANS

SYSTEM DESCRIPTION/OPERATION (3)

B2 SCOPE

CAUTION: MODULE TAGGED B2 SCOPE.
BE AWARE THAT ONLY AVIONICS/ELECTRICAL TOPICS SHOULD BE LEARNED FOR A T2 COURSE.

GENERAL

The nose wheel steering system is supplied by the yellow hydraulic system and is composed of several components which are described in detail in the following sections.

SWIVEL SELECTOR VALVE

The swivel selector valve is installed co-axially with respect to the L/G retraction axis and provides hydraulic power supply when the gear is extended. When the gear starts to retract, the swivel selector valve cuts the hydraulic power supply.

CHECK VALVE/FILTER

A 40-micron filter and a check valve are installed in the hydraulic power supply line followed with a second check valve mounted between the filter and the servo valve.

SERVO VALVE

The servo valve is of the deflection-jet type. It is equipped with a Linear Variable Differential Transducer (LVDT) sensor which detects the position of the slide valve. The LVDT provides position feedback for the steering control.

ADJUSTABLE DIAPHRAGM

The adjustable diaphragms are used to adjust the flow to each actuating cylinder chamber and consequently the wheel steering speed.

CHECK VALVES

Two check valves ensure the distribution of fluid from the accumulator to the chamber of the steering actuator.

BYPASS VALVE

The bypass valve interconnects the two chambers of the steering actuator in the event of hydraulic system depressurization. The bypass valve opens if the pressure exceeds 273 bar (4000 psi).

ANTI-SHIMMY VALVES

There is one anti-shimmy valve per steering actuator chamber.

STEERING ACTUATOR

The steering actuator drives the rotating tube, which is part of the NLG structure, via a rack-and-pinion assembly.

ACCUMULATOR

The anti-shimmy accumulator supplies pressurized fluid in case of cavitation in one of the two chambers of the steering actuator. The accumulator can supply fluid pressurized up to 15 bar (220 psi).

BLEED SCREW

A bleed screw allows bleeding and depressurization of the hydraulic block.

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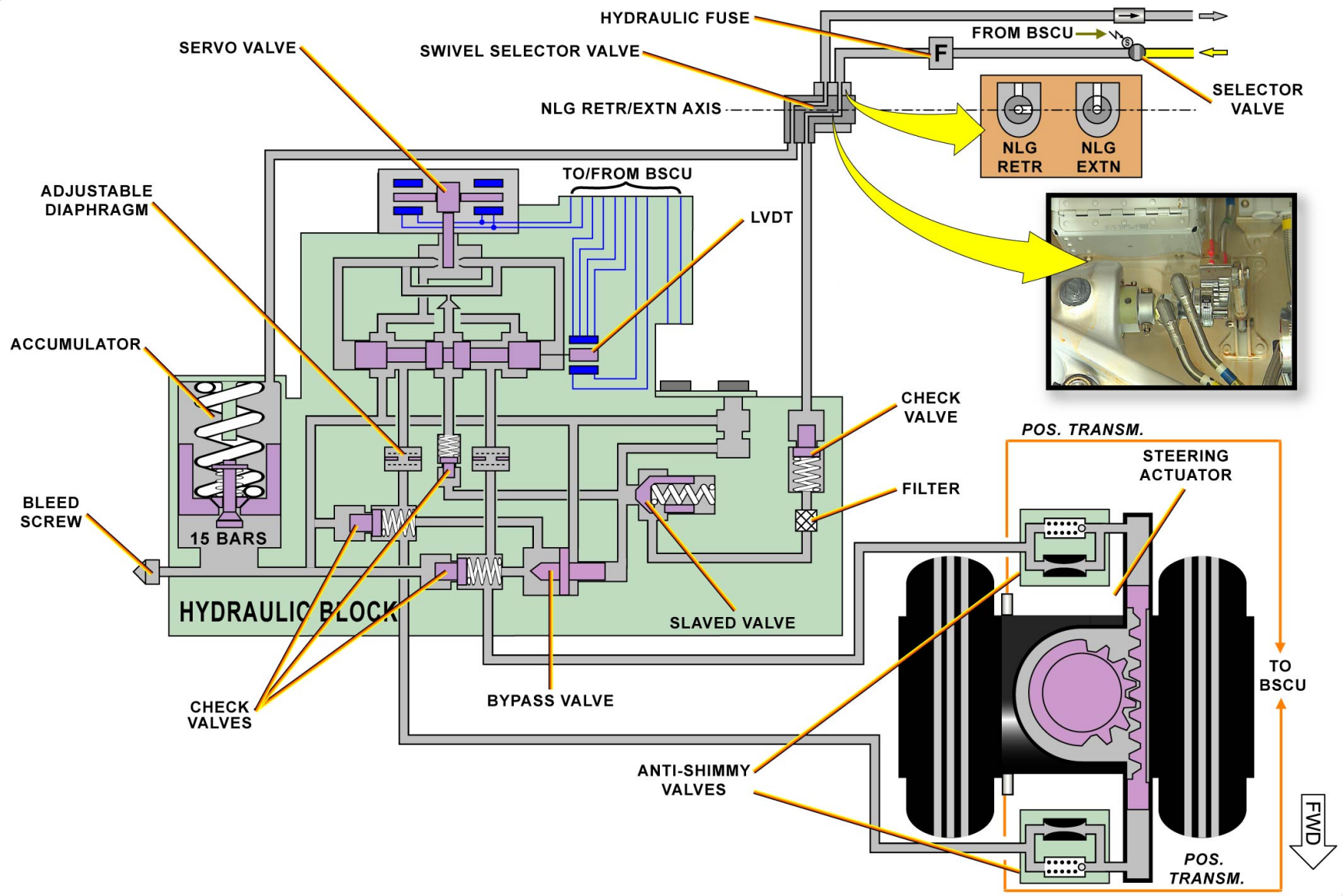


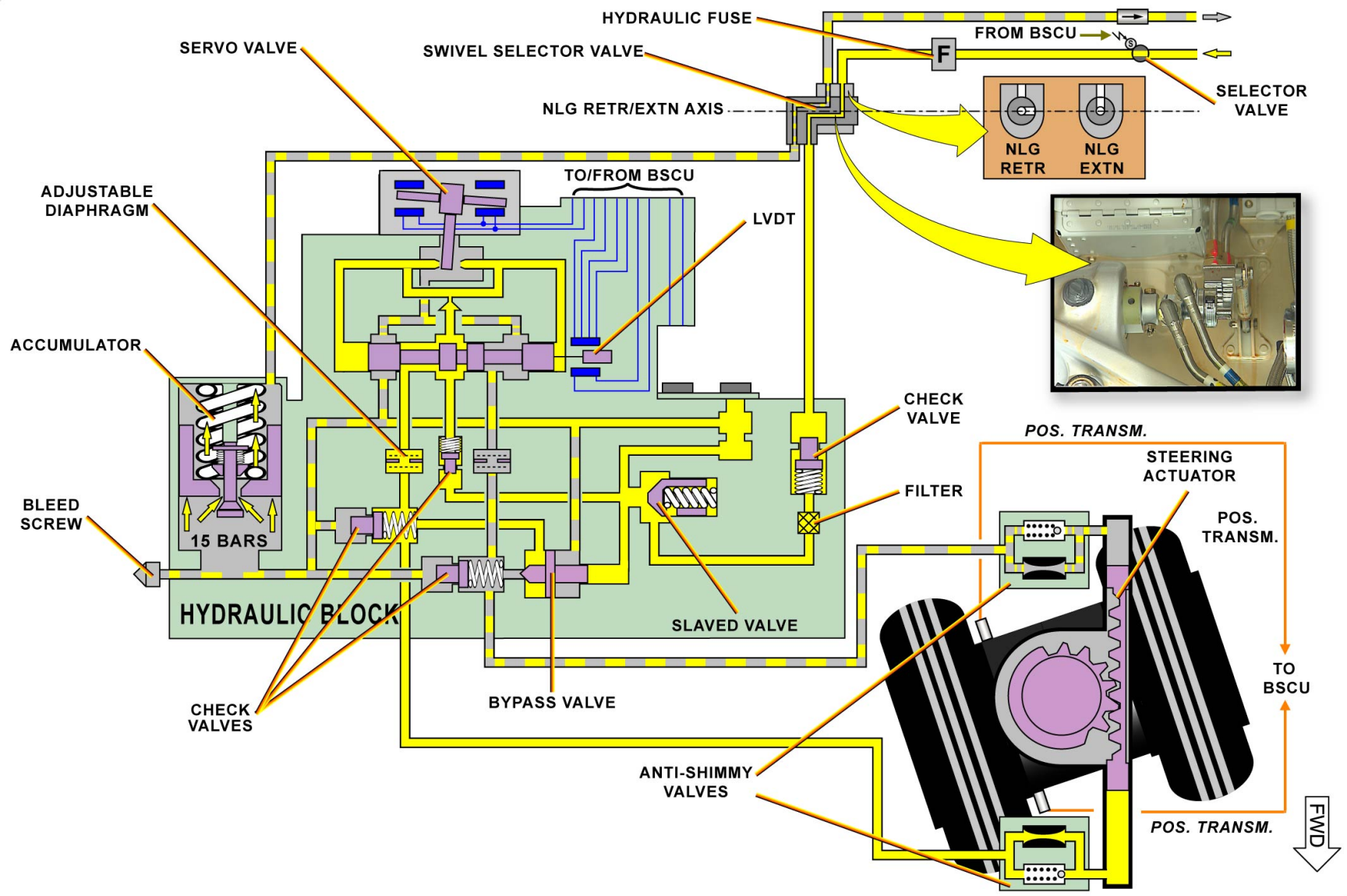
B2 SCOPE & GENERAL

SYSTEM DESCRIPTION/OPERATION (3)

OPERATION

When the nose gear is extended, the hydraulic block is pressurized. When the MLG is compressed, both chambers of the steering actuator are supplied and the nose wheels servoed to an angle of 0º. Depending on the BSCU reference speed and the nose wheel steering orders, the nose wheels are steered.

UGB13131 - U7ST0M0 - UM32DI000000002


HYDRAULIC FUSE
FROM BSCU
SERVO VALVE
SWIVEL SELECTOR VALVE
SELECTOR VALVE
NLG RETR/EXTN AXIS
NLG RETR
NLG EXTN
TO/FROM BSCU
ADJUSTABLE DIAPHRAGM
LVDT
ACCUMULATOR
CHECK VALVE
POS. TRANSM.
STEERING ACTUATOR
FILTER
BLEED SCREW
15 BARS
POS. TRANSM.
HYDRAULIC BLOCK
SLAVED VALVE
TO BSCU
CHECK VALVES
BYPASS VALVE
ANTI-SHIMMY VALVES
POS. TRANSM.
FWD

OPERATION

BSCU CONTROL INTERFACES (3)

ADIRU

The aircraft reference speed for nose wheel steering and anti-skid functions is obtained by processing the inertial deceleration from the Air Data Inertial Reference Units (ADIRUs).

SEC

Two of the three ground spoilers extended signals coming from the Spoiler Elevator Computers (SECs) must be present to enable automatic braking.

LGCIU

Inputs from both Landing Gear Control and Interface Units (LGCIUs) serve for braking and nose wheel steering functions control logic. LGCIUs receive wheel speed indications. These signals are used for BITE inhibition.

ELAC

The link between the Braking Steering Control Unit (BSCU) and the ELevator Aileron Computer (ELAC) serves for nose wheel steering purposes with orders coming from rudder pedals and autopilot.

BTMU

The BSCU changes analog signals from the Brake Temperature Monitoring Units (BTMUs) into digital ones for temperature indication on the lower ECAM display unit.

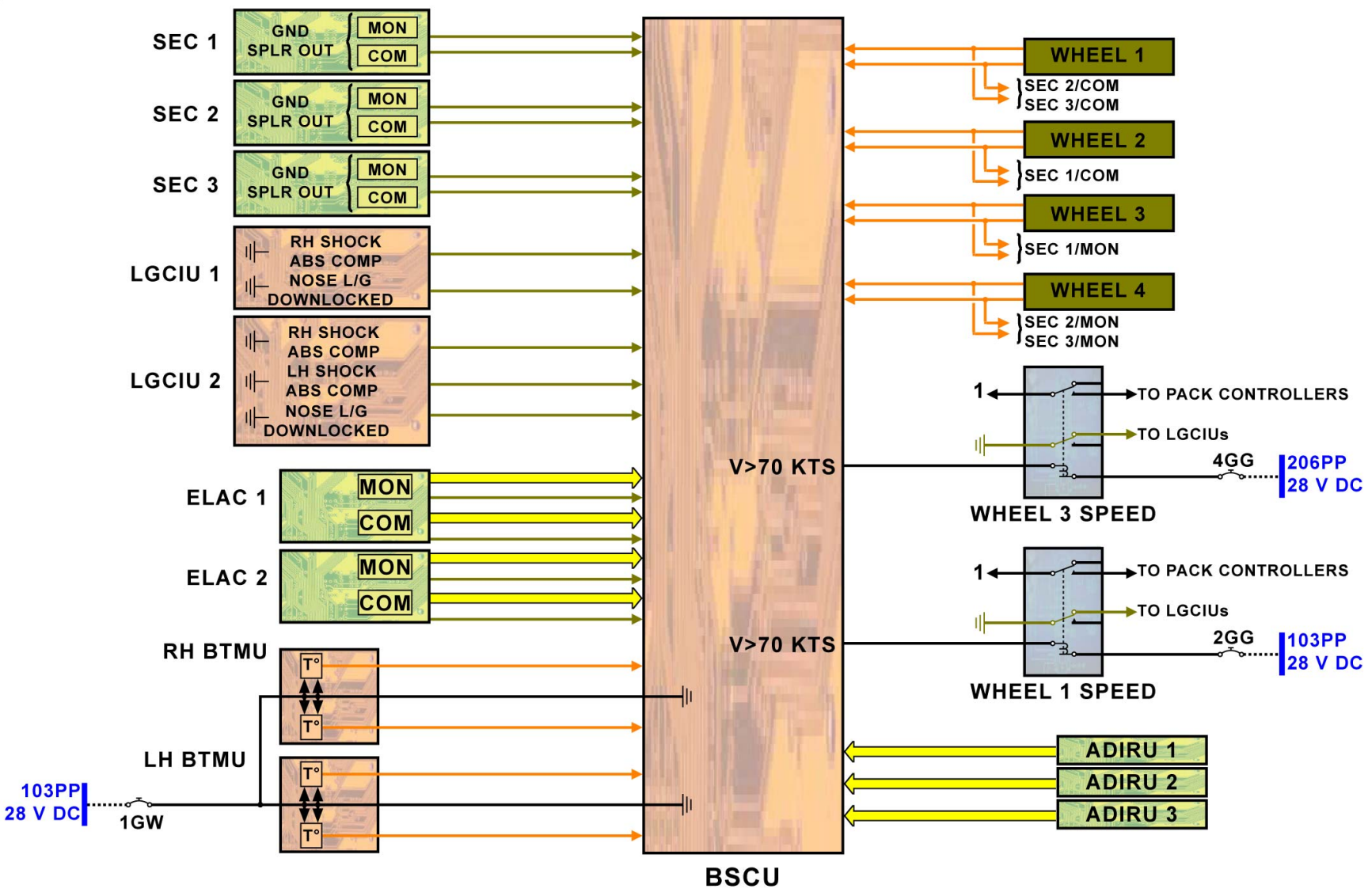
TACHOMETERS

Tachometers send wheel speed values to the BSCU enabling reference speed computation and also to the SECs for ground spoilers extension logic.

PACK CONTROLLERS

After wheel speed computation the BSCU energizes wheel speed relays. These relays send a signal to the pack controllers for pack ram air inlet operation during take-off and landing phases.

UGB13131 - U7ST0M0 - UM32F2000000002



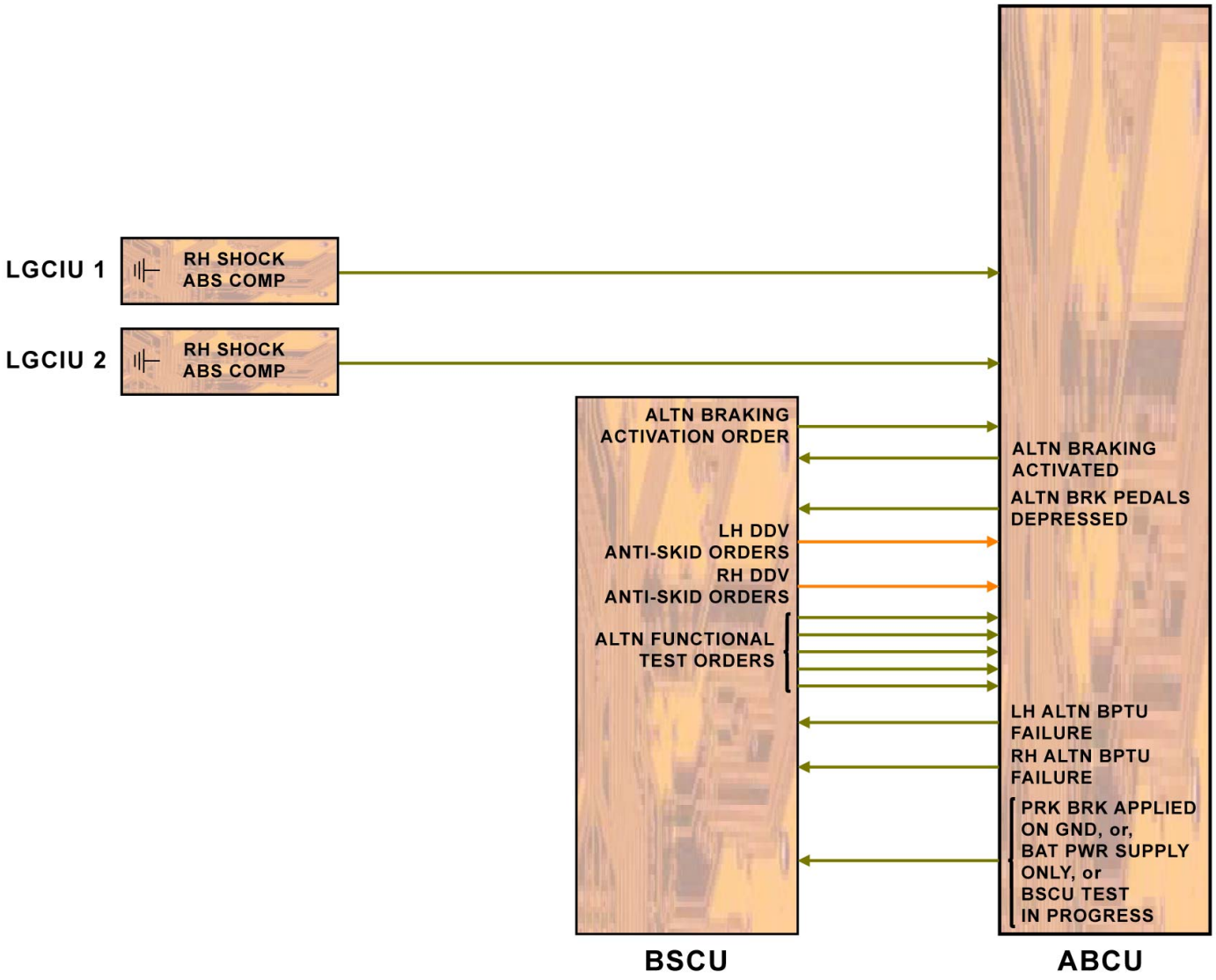
ADIRU ... PACK CONTROLLERS

BSCU CONTROL INTERFACES (3)

ABCU

The BSCU requests for alternate braking when necessary and provides anti-skid orders to be applied to both DDV.
In order to test the alternate braking capability, the BSCU sends functional test orders to the Alternate Braking Control Unit (ABCU) in predetermined test sequences. For safety reasons, these tests are inhibited by the main landing gear compressed position signal by the ABCU.
Moreover the ABCU sends alternate Brake Pressure Transmitter Unit (BPTU) failure and alternate system status to the BSCU.

UGB13131 - U7ST0M0 - UM32F2000000002


LGCIU 1
RH SHOCK ABS COMP
LGCIU 2
RH SHOCK ABS COMP
ALTN BRAKING ACTIVATION ORDER
LH DDV ANTI-SKID ORDERS
RH DDV ANTI-SKID ORDERS
ALTN FUNCTIONAL TEST ORDERS
BSCU
ALTN BRAKING ACTIVATED
ALTN BRK PEDALS DEPRESSED
LH ALTN BPTU FAILURE
RH ALTN BPTU FAILURE
PRK BRK APPLIED ON GND, or, BAT PWR SUPPLY ONLY, or BSCU TEST IN PROGRESS
ABCU

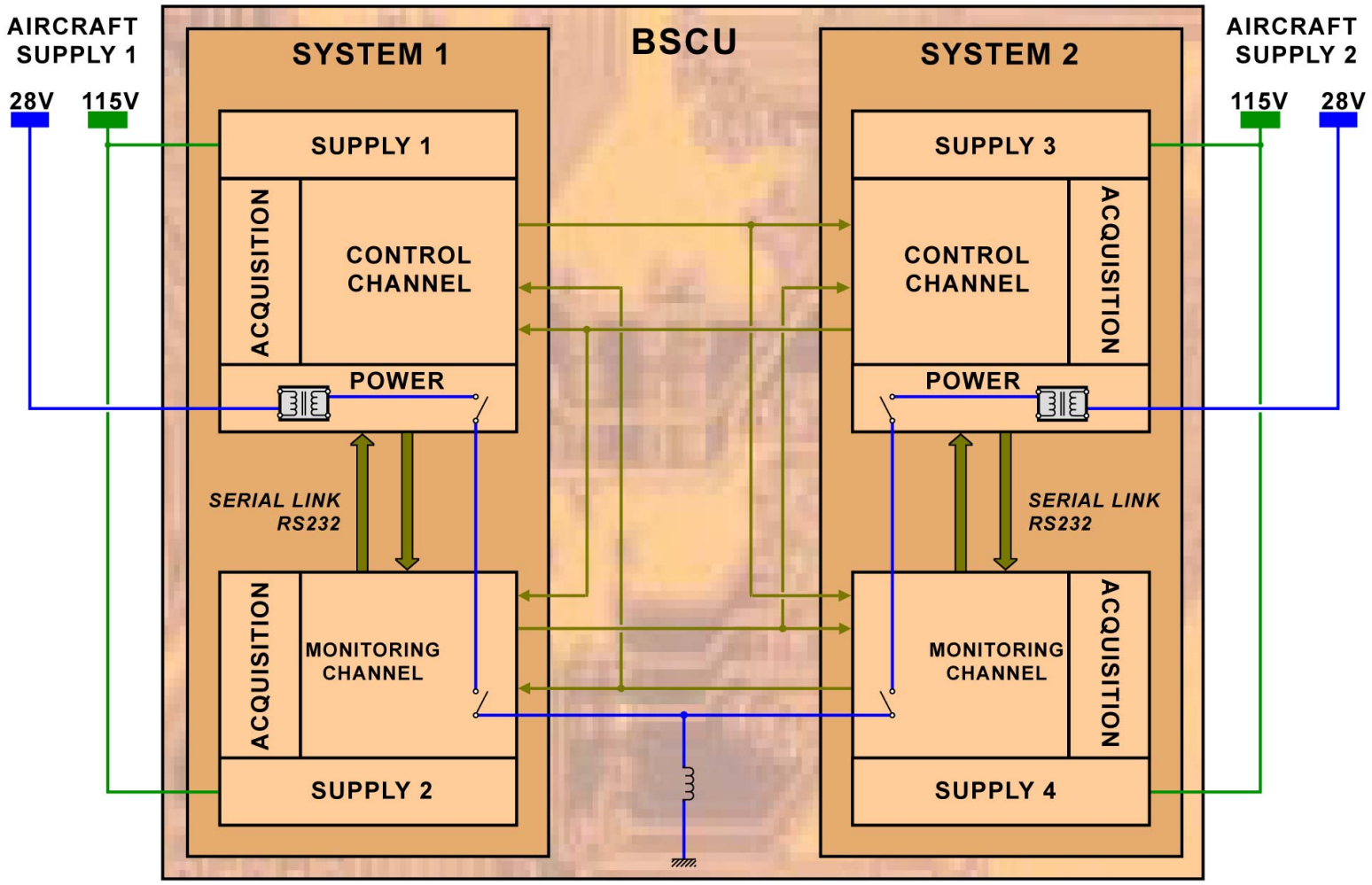
ABCU

BSCU ARCHITECTURE & MONITORING INTFC (3)

ARCHITECTURE

The Braking/Steering Control Unit (BSCU) has two power supply units, one for each systems. At each power up the system supplied first takes the control. If both systems are powered up at the same time, system 1 has priority. At each extension of the L/G, the system on command will go to standby and the other system will take over the control. If there is a disagreement between the control and the monitoring channels, the related system is disengaged and the system in standby takes over.

UGB13131 - U7ST0M0 - UM32F3000000002



ARCHITECTURE

BSCU ARCHITECTURE & MONITORING INTFC (3)

MONITORING

The monitoring is carried out by various computers described below.

CFDIU

The BSCU sends BITE data to the Centralized Fault Display System (CFDS) by a bi-directional ARINC 429 link. This link transmits the failure messages.

SDAC

The System Data Acquisition Concentrators (SDACs) receive ARINC 429 bus signals for acquisition and processing of all the data necessary for the generation of warnings.

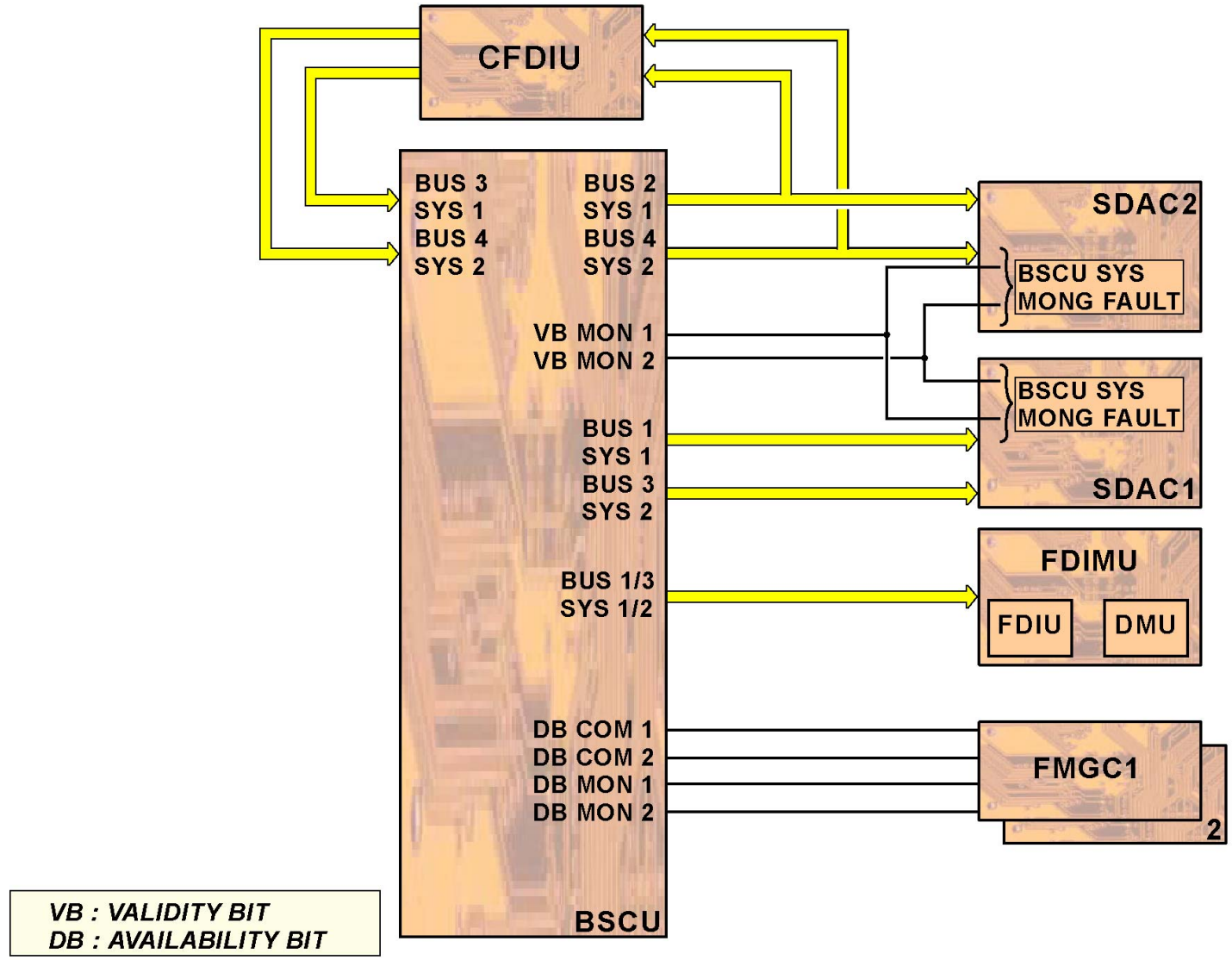
FDIMU

The Flight Data Interface Unit (FDIU) part of the Flight Data Interface and Management Unit (FDIMU) collects braking system data like braking pressure, braking pedal position, auto brake status and maintenance data in order to send them to the flight data recorder. The Digital Management Unit (DMU) part of the FDIMU receives maintenance data for reports used in preventive maintenance.

FMGC

The BSCU sends 4 availability discretes to the Flight Management and Guidance Computers (FMGCs). This is to meet the safety requirements of a category 3B landing.

UGB13131 - U7ST0M0 - UM32F3000000002



MONITORING - CFDIU ... FMGC

ABCU ARCHITECTURE & MONITORING INTFC (3)

architecture

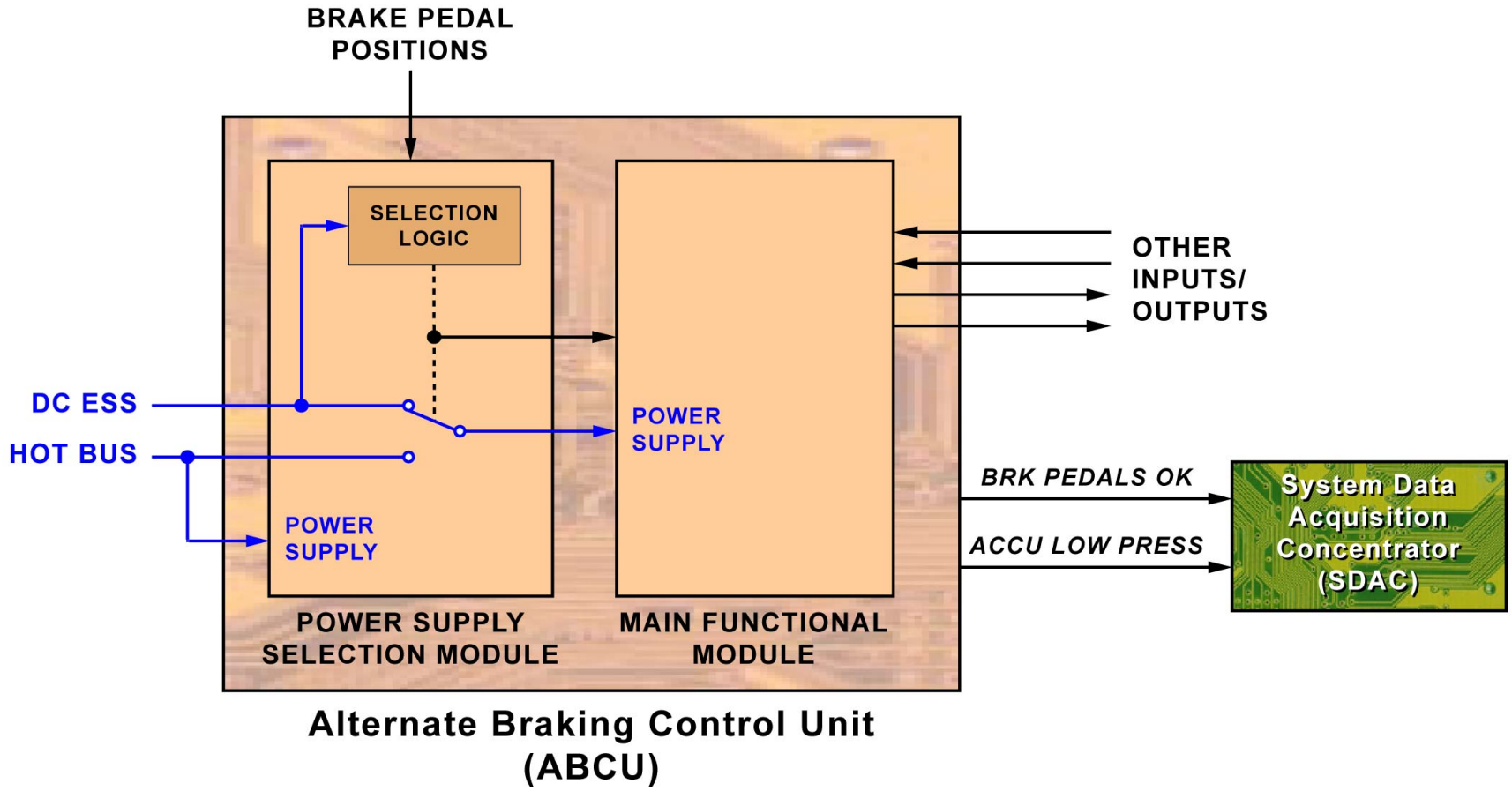
The Alternate Braking Control Unit (ABCU) is made of two functional modules:
- The power supply selection module,
- The main functional module.

The ABCU is supplied with two different DC power supplies:
- DC Essential power supply,
- DC Battery power supply.

SDAC

Two discrete signals are sent to the System Data Acquisition Concentrators (SDACs) by the ABCU:
- Both left and right alternate brake pedals operate correctly.
- Brake accumulator pressure is low.

UGB13131 - U7ST0M0 - UM32F4000000001



ARCHITECTURE & SDAC

SYSTEM DESCRIPTION/OPERATION (3)

PURPOSE

The Tire Pressure Indicating System (TPIS) continuously monitors the absolute pressure of each individual tire and provides cockpit indications and warnings.

PRESSURE TRANSDUCER

A pressure transducer installed in the wheel rim measures the pressure of each tire. The pressure transducer gives a DC signal from 0 to 100mV in proportion to the pressure.

ROTATING MECHANISM

The rotating mechanism serves to transmit the tire pressure signal from the wheel to the axle. The rotating transformer also provides the necessary power supply for the electronic module and the pressure transducer in the form of a 3125Hz signal.

ELECTRONIC MODULE

The integrated electronic module amplifies the signal from the pressure transducer and changes the voltage into frequency by means of a converter. The voltage to frequency converter gives a signal which varies from 50 to 100kHz for a pressure range from 0 to 300 psi.

ROTATING TRANSFORMER

The rotating transformer transmits the tire pressure value from the wheel to the detection unit.

DETECTION UNIT

The detection unit comprises a microprocessor which provides data processing and distribution of each tire pressure including normal and abnormal pressure signals for ECAM indication and Centralized Fault Display System (CFDS) monitoring. The TPIS detection unit permanently performs a test of the unit itself, the rotating mechanism and the pressure transducer. The test is only stopped for data processing and distribution.

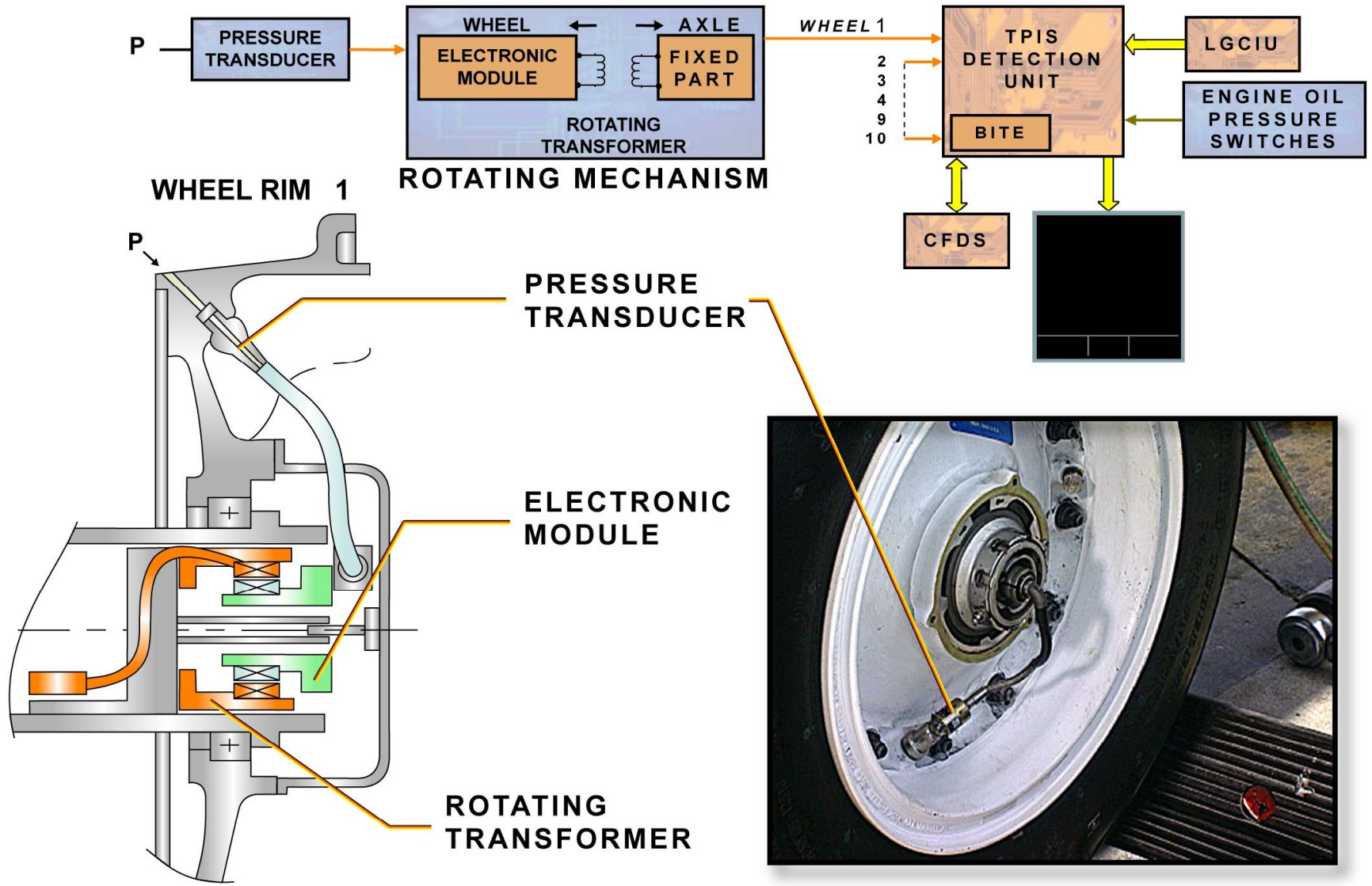
INTERFACES

The signal from the Landing Gear Control and Interface Unit (LGCIU) is used to change the tire pressure threshold for on-ground or in-flight warnings.

ENGINE OIL PRESSURE SWITCHES

The engine oil pressure signal is sent to the TPIS detection unit for information concerning engine running.

NOTE: Tire pressure warnings are only memorized by the BITE when at least one engine is running to prevent false warnings during wheel change.



PURPOSE ... ENGINE OIL PRESSURE SWITCHES

LANDING GEAR SYSTEM OPERATION, CONTROL & INDICATING (3)

LANDING GEAR SEQUENCE NORMAL/FREE FALL CONTROL/INDICATING/ OPERATION

LANDING GEAR NOT DOWNLOCKED FAILURE

NORMAL BRAKING CONTROL / INDICATING / OPERATION

ALTERNATE BRAKING & PARKING BRAKE CONTROL / INDICATING / OPERATION

AUTOMATIC BRAKING FAILURE

NOSE WHELL STEERING CONTROL / INDICATING / OPERATION

UGB13131 - U7ST0M0 - UM32IZLEVEL0302

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LANDING GEAR SYSTEM LINE MAINTENANCE (2)

SERVICING

MLG SHOCK ABSORBER

Charging valves are installed on the MLG to fill the two-stage shock absorber with nitrogen.
As a Maintenance Planning Document (MPD) task, the check of the Main Landing Gear (MLG) shock absorber charge is done by measuring and recording the dimension H.
Correct values will be found in the AMM and instructions are given on the MLG strut cylinder.

MLG SPARE SEAL ACTIVATING VALVE

Each MLG fitting has a spare seal-activating valve.
This valve is used to isolate the bottom gland seal if a hydraulic leak occurs from that position.
Closing the spare seal-activating valve will isolate the bottom gland seals and activate the top gland seals.

NOTE: It is recommended that all gland seals on the applicable MLG be replaced at subsequent scheduled maintenance.

NLG SHOCK ABSORBER

As a MPD task, the check of the NLG shock absorber charge pressure is performed by measuring and recording the dimension H on the NLG strut.
Correct values of this dimension are given in the AMM and on the NLG servicing chart.
If nitrogen refilling is necessary, it can be done via the charging valve.

NOTE: You can complete this procedure with the A/C on the ground or on jacks. If the A/C is on jacks, it must be positioned correctly.

ACCUMULATOR

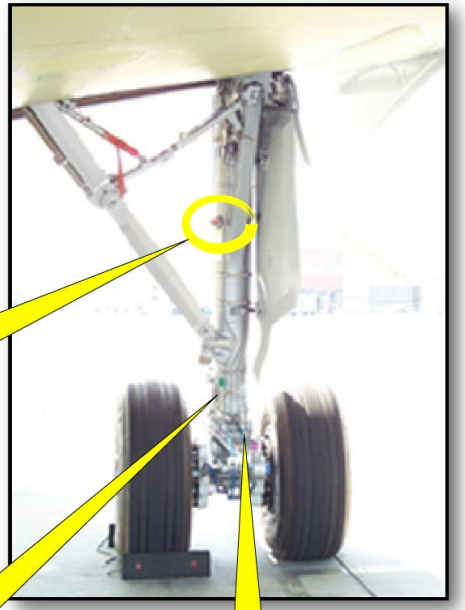
A check of the nitrogen fill pressure is performed via the accumulator pressure gage on the yellow brake accumulator.
The relief valve allows the hydraulic depressurization of the accumulator to check its nitrogen pre-charge as required by the MPD.

UGB13131 - U7ST0M0 - UM32BA000000002

NOSE LANDING GEAR

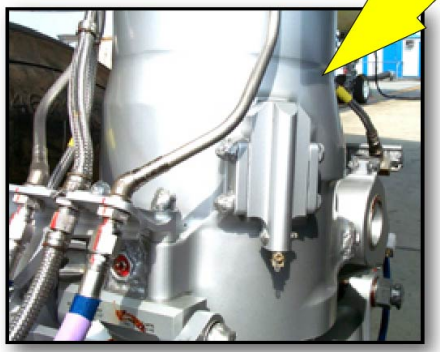
NLG CHARGING VALVE

MAIN LANDING GEAR

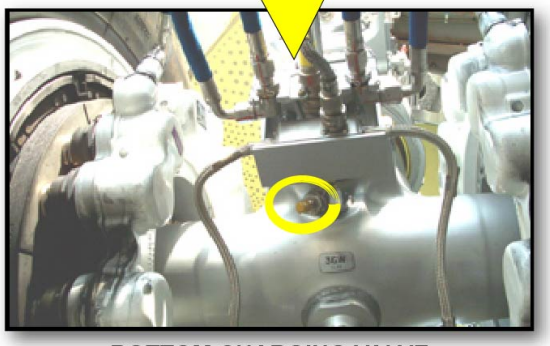


TOP CHARGING VALVE

BRAKE ACCUMULATOR



SPARE SEAL ACTIVATING VALVE



BOTTOM CHARGING VALVE

SERVICING - MLG SHOCK ABSORBER ... ACCUMULATOR

LANDING GEAR SYSTEM LINE MAINTENANCE (2)

SERVICING (continued)

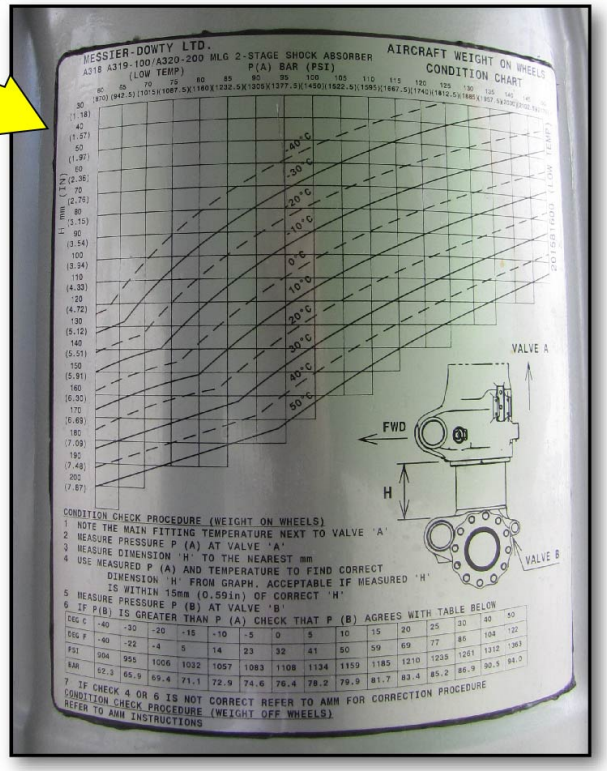
SERVICING PLACARDS

Placards are installed on the NLG and the MLG to give the necessary instructions related to pressure check and nitrogen filling.
They also tell the user to refer to the AMM for servicing.

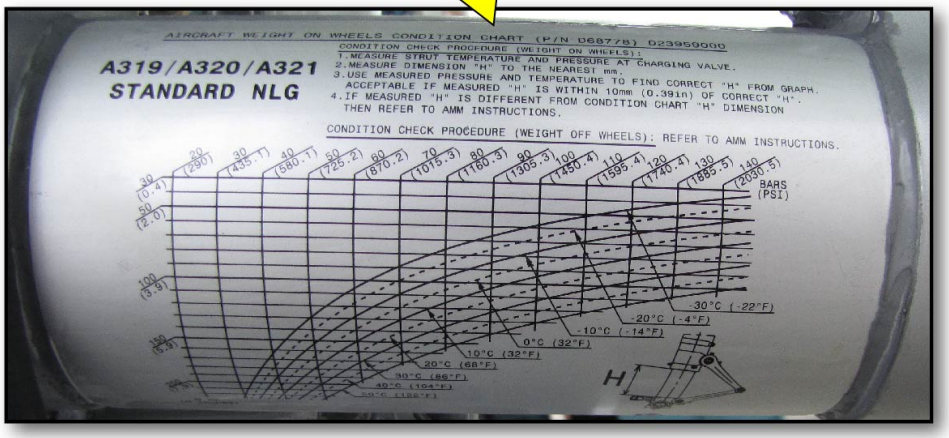
UGB13131 - U7ST0M0 - UM32BA000000002

NOSE LANDING GEAR

This chart is shown as example.
It is applicable to A318, A319-100/A320-200 equipped with an MLG 2-stage shock absorber.


MESSIER-DOWTY LTD.
A318 A319-100/A320-200 MLG 2-STAGE SHOCK ABSORBER
P(A) BAR (PSI)
(LOW TEMP)
AIRCRAFT WEIGHT ON WHEELS
CONDITION CHART
VALVE A
VALVE B
FWD
H
CONDITION CHECK PROCEDURE (WEIGHT ON WHEELS)
1 NOTE THE MAIN FITTING TEMPERATURE NEXT TO VALVE 'A'
2 MEASURE PRESSURE P (A) AT VALVE 'A'
3 MEASURE DIMENSION 'H' TO THE NEAREST mm
4 USE MEASURED P (A) AND TEMPERATURE TO FIND CORRECT DIMENSION 'H' FROM GRAPH. ACCEPTABLE IF MEASURED 'H' IS WITHIN 15mm (0.59in) OF CORRECT 'H'
5 MEASURE PRESSURE P (B) AT VALVE 'B'
6 IF P(B) IS GREATER THAN P (A) CHECK THAT P (B) AGREES WITH TABLE BELOW
7 IF CHECK 4 OR 6 IS NOT CORRECT REFER TO AMM FOR CORRECTION PROCEDURE
CONDITION CHECK PROCEDURE (WEIGHT OFF WHEELS)
REFER TO AMM INSTRUCTIONS

MLG SERVICING CHART


AIRCRAFT WEIGHT ON WHEELS CONDITION CHART (P/N D68775) D23959000
A319/A320/A321
STANDARD NLG
CONDITION CHECK PROCEDURE (WEIGHT ON WHEELS):
1.MEASURE STRUT TEMPERATURE AND PRESSURE AT CHARGING VALVE.
2.MEASURE DIMENSION 'H' TO THE NEAREST mm.
3.USE MEASURED PRESSURE AND TEMPERATURE TO FIND CORRECT "H" FROM GRAPH. ACCEPTABLE IF MEASURED "H" IS WITHIN 10mm (0.391n) OF CORRECT "H". THEN REFER TO AMM INSTRUCTIONS.
4.IF MEASURED "H" IS DIFFERENT FROM CONDITION CHART "H" DIMENSION
CONDITION CHECK PROCEDURE (WEIGHT OFF WHEELS): REFER TO AMM INSTRUCTIONS.
BARS (PSI)
-30°C (-22°F)
-20°C (-4°F)
-10°C (14°F)
0°C (32°F)
10°C (50°F)
20°C (68°F)
30°C (86°F)
40°C (104°F)
H

NLG SERVICING CHART

SERVICING - SERVICING PLACARDS

LANDING GEAR SYSTEM LINE MAINTENANCE (2)

DAILY CHECK

During the Daily check the external walk around will include the Visual check of the Nose Landing Gear and LH/RH Main Landing Gear assemblies for general condition including:
- Doors and wheel well,
- Gear structure,
- Shock Absorber sliding tube for correct extension (dimension H) and cleanliness,
- Proximity detectors,
- Wheels (rim damage, sheared or missing bolts),
- Tires (wear, damage, and correct pressure),
- Brake units for evidence of leakage or overheating,
- Heat-Pack wear indicators (check with parking brake applied).

NOTE: The visual check of the Landing Gear Wheel Well is done with the Landing Gear Doors in the closed position.

When it is possible, do the Tire Pressure Check when the tires are cold. If it is necessary to do the check when the tires are hot: the pressure in the tires will be higher than the nominal value (you must not deflate a hot tire).

Readjust the tire pressure using Nitrogen only and refer to the AMM Tire inflation tables (32-41-00). The AMM Tire inflation tables give all the pressure values versus aircraft weight (MRW) and tire sizes.

This table is given as an example.

UGB13131 - U7ST0M0 - UM32BA000000002

LANDING GEAR DOORS

LANDING GEAR STRUCTURE

FOR TRAINING ONLY

MRW 93.4T/93.9T

TIRE PRESSURE		TIRE CONDITION/ACTION NECESSARY
NLG 30X8.8-15 30X8.8R15	MLG 49X18-22 1270x455R22	
More than 12.2 bars (177 psi)	More than 15.7 bars (227 psi)	Over-inflation. Make sure that the measurement is correct with another pressure gage. If it is correct, deflate the tire to the maximum normal pressure.
11.6 to 12.2 bars (168-12psi)	15 to 15.7 bars (217-227psi)	Normal pressure range. Do not adjust the tire pressure.
11 to 11.6 bars (160-168psi)	14.2to 15 bars (206-217psi)	Inflate the tire to the maximum normal pressure.
10.4 to 11 bars (151-160psi)	13.5 to 14.2 bars (196-206psi)	Inflate the tire to the maximum normal pressure. You must measure the tire pressure again the next day. If the tire is under-inflated again, you must replace the wheel.
9.3 to 10.4 bars (135-151psi)	12 to 13.5 bars (174-196psi)	You must replace the wheel.
0 to 9.3 bars (0-133psi)	0 to 12 bars (0-174psi)	You must replace the wheel and the adjacent wheel.

WEAR PIN

WHEEL BRAKE

GEAR PROXIMITY SENSOR

WHEEL & TIRE

DAILY CHECK

LANDING GEAR SYSTEM LINE MAINTENANCE (2)

MEL/DEACTIVATION

PROXIMITY SENSORS

Sixteen proximity detectors are installed. They are Master Minimum Equipment List (MMEL) items.
One proximity detector may be inoperative on system 2 if the origin of the failure is electrical.

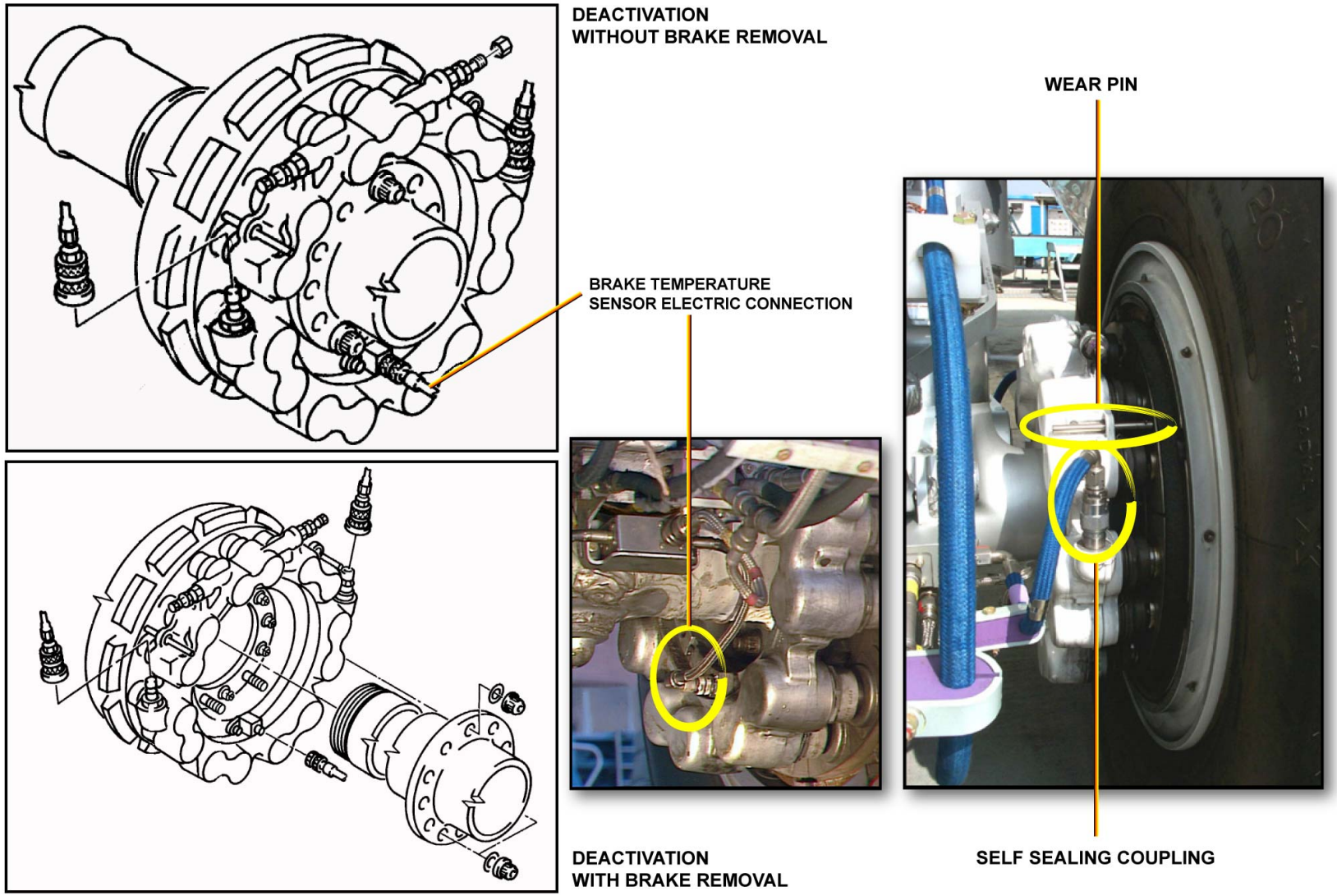
BTMU

Two BTMUs are installed; one or both may be inoperative if the brake-cooling time is applied.

MAIN WHEEL BRAKES

Two wear pins give a visual indication of the overall wear of the heat pack. The wheel brake is a MMEL item.
In case of hydraulic leak on the brake assembly (piston), the brake can be deactivated for dispatch with or without brake removal.
For deactivation with the brake installed, disconnect the self-sealing coupling.

UGB13131 - U7ST0M0 - UM32BA000000002



MEL/DEACTIVATION - PROXIMITY SENSORS ... MAIN WHEEL BRAKES

LANDING GEAR SYSTEM LINE MAINTENANCE (2)

MAINTENANCE TIPS

HYDRAULIC FUSES

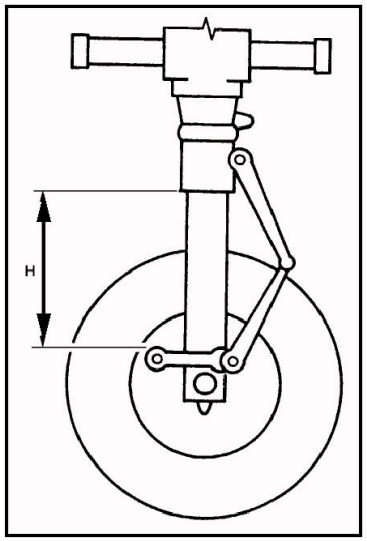
A hydraulic fuse (normal or alternate), installed between the servo valve and the brake, stops the flow in the line in case of leakage. After trouble-shooting, the hydraulic fuse needs to be reset by opening its bleed screw.

NOTE: Be careful when opening the bleed screw of the brake bleed valve assembly, you could close the hydraulic fuse.

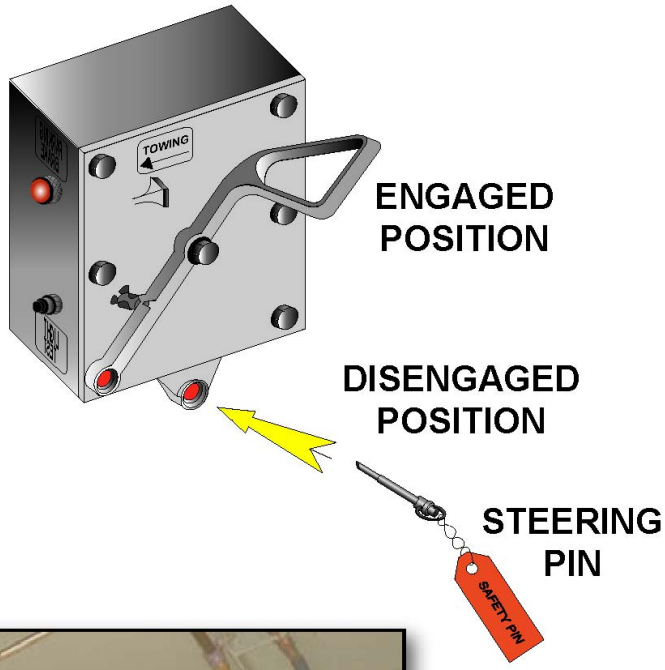
NOSE WHEEL STEERING

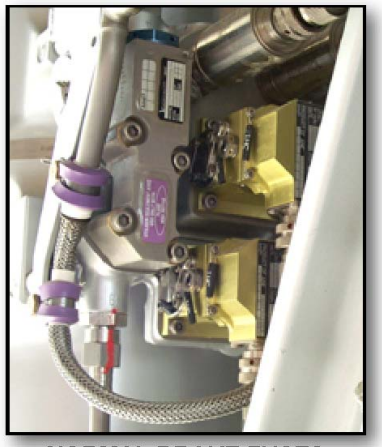
The maximum towing angle is 95° on each side. Before towing, the N/WS control lever has to be in the deactivation position with the safety pin installed and the maximum extension of the nose gear shock absorber (dimension H) must be less than 300mm (12 inches) to avoid upper cam damage. When resetting the steering function after towing, nose wheels must be centered to avoid injury.

UGB13131 - U7ST0M0 - UM32BA000000002

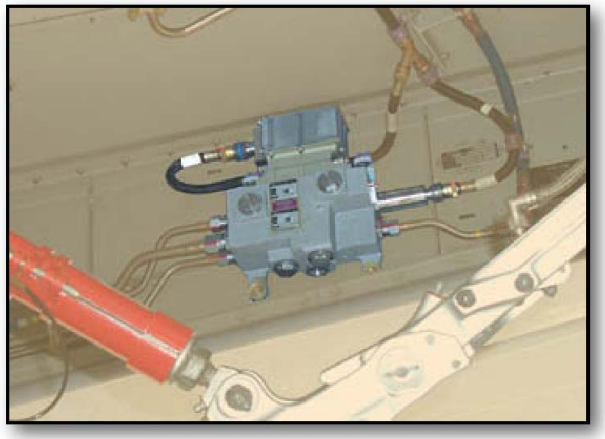


MAXIMUM EXTENSION OF THE NOSE GEAR SHOCK ABSORBER DURING TOWING





NORMAL BRAKE FUSES



ALTERNATE BRAKE FUSES

MAINTENANCE TIPS - HYDRAULIC FUSES & NOSE WHEEL STEERING

LANDING GEAR SYSTEM LINE MAINTENANCE (2)

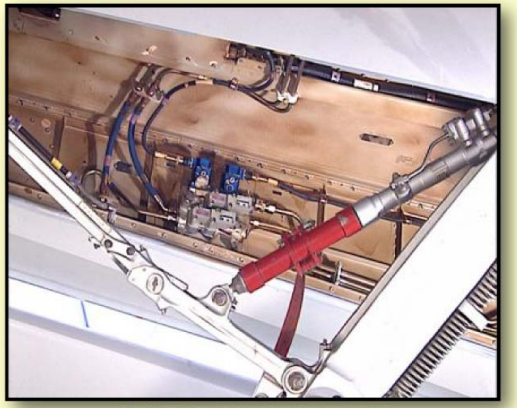
MAINTENANCE TIPS (continued)

SAFETY PRECAUTIONS

Before working in the L/G wheel well, be sure that the safety sleeve is fitted on the MLG door (or for the NLG, safety pins installed).
Procedures related to L/G door safety devices installation are described in the AMM
When towing, except for pushback, or working in the L/G wheel well, be sure that the safety sleeve is fitted on the MLG or safety pins are installed on the NLG.
Procedures related to L/G safety devices installation are described in the AMM.
The LGCIU interfaces with many other A/C systems. Pulling LGCIU circuit breakers can cause unwanted operation of some systems. Before pulling LGCIU CBs, the AMM procedure about flight configuration precautions must be followed in order to protect these systems.

UGB13131 - U7ST0M0 - UM32BA000000002

MAIN LANDING GEAR



GROUND SLEEVE LOCK

DOOR SAFETY SLEEVE

NOSE LANDING GEAR

DOWNLOCK SAFETY PIN

DOOR SAFETY PIN

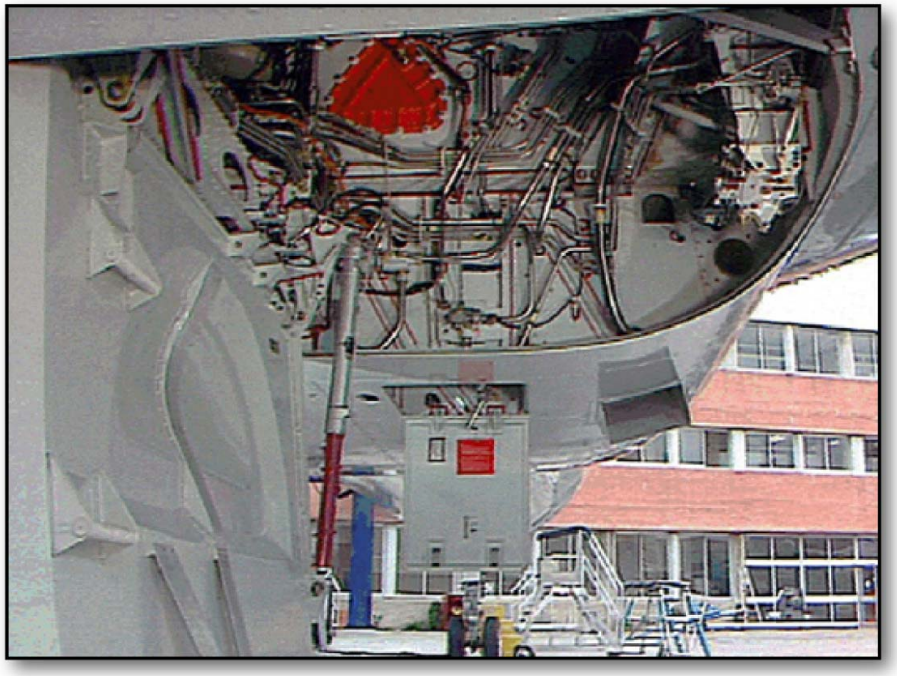
MAINTENANCE TIPS - SAFETY PRECAUTIONS

LANDING GEAR SYSTEM LINE MAINTENANCE (2)

MPD CHECK ITEMS

In accordance with the MPD (600FH, 750FC or 100 days) the external walk around will include the Visual check of the Nose Landing Gear and LH/RH Main Landing Gear assemblies for general condition with the Landing Gear Doors opened for the Wheel Well inspection.
When opening the Main or the Nose Landing Gear Doors with the Ground Opening system, observe all the Safety Precautions as stated in the AMM Tasks.

UGB13131 - U7ST0M0 - UM32BA000000002



MAIN LANDING GEAR WHEEL WELL DOOR

NOSE LANDING
GEAR WHEEL WELL

Visual check of the MLG/NLG wheel with the L/G doors opened

MPD CHECK ITEMS

JACKING (2)

GENERAL

Three jacking points, when equipped with jacking pads, are used to lift the aircraft. The forward point "A" is located forward of the nose landing gear. The points "B" are located outboard of the engine pylons. A safety stay must be positioned at the rear of the aircraft after jacking to stabilize the aircraft. You can lift the aircraft at the forward jacking point only, with the wheels of the main landing gear on the ground.
When the aircraft is weighed on landing gear jacks the following jacking points must be used to lift it.
- 2 jacking points located in the main landing gear,
- 1 jacking point located in the nose landing gear.

LIMITATIONS

The open air jacking operation is limited if the wind velocity exceeds permissible values which depend on aircraft gross weight and center of gravity position. In any condition, the aircraft must be pointing upwind.

PRECAUTIONS

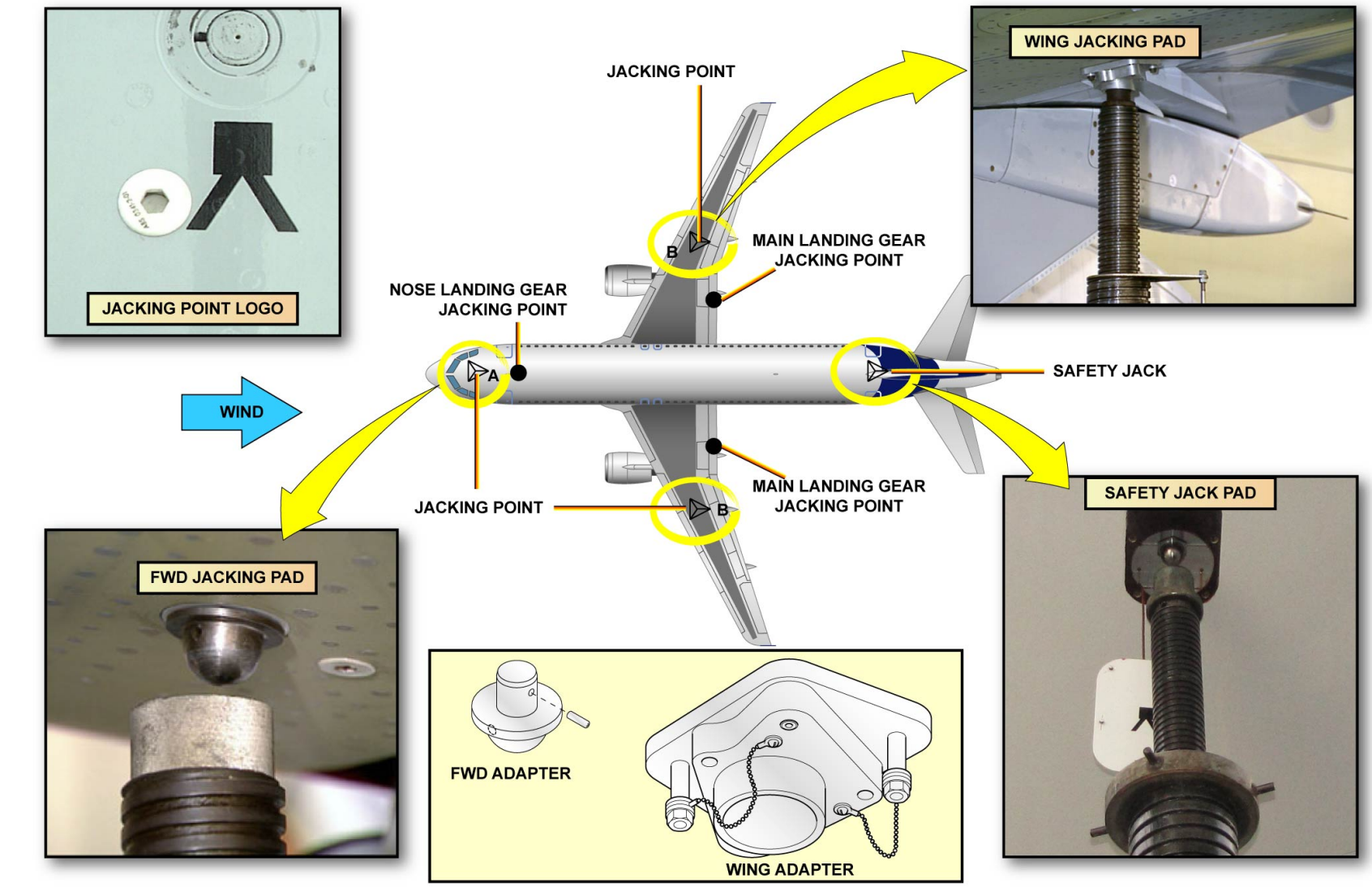
Before you lift the aircraft, you must be sure that the ground safety-locks are in position on the landing gears and the weight of fuel is applied equally on the two sides of the aircraft centerline. The three jacks must be operated together.
When the jacking operation is completed, install the safety stay to make the aircraft stable. Do not use the safety stay to lift the aircraft. The safety stay must be removed for the gear swing.

JACKING POINTS

Put jacking pads below the jacking points to apply the loads equally.

NOTE: It is necessary to use the jack pad adapters when the aircraft is put on jacks.

The LH, RH and nose jack pad adapters are different and must not be interchanged.
Those for the A321 are also different from those of the other aircraft and must not be interchanged.



GENERAL ... JACKING POINTS

JACKING (2)

LEVELING AND WEIGHING

WEIGHING

You can weigh the aircraft with:
- the aircraft on jacks,
- the aircraft on its wheels,
- the aircraft on landing gear jacks.

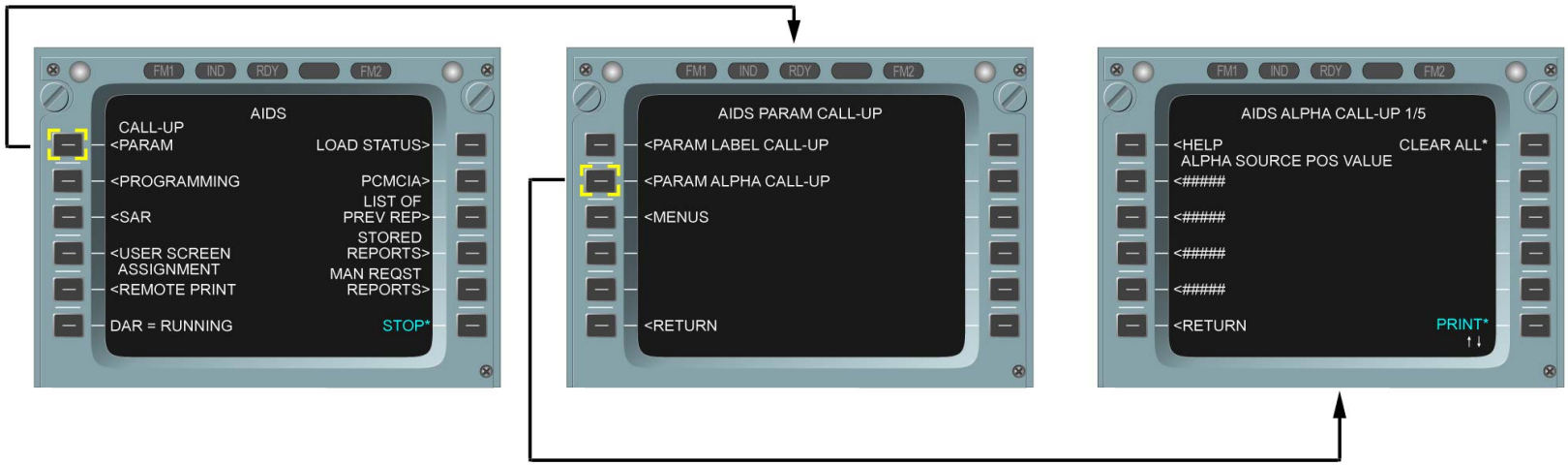
Load cells on each jack or platform scales are used for weighing.

QUICK LEVELING PROCEDURE WITH THE ADIRU

First, follow the Inertial Reference (IR) alignment procedure. Then on the MCDU scratchpad the alpha call-up code has to be entered:
- PTCH for the pitch angle to do a check of the longitudinal alignment,
- ROLL for the roll angle to do a check of the transverse alignment.

To start this procedure, first of all the aircraft must be lifted. After that, read the pitch and roll angles in the MCDU scratchpad.
Then operate the hydraulic jack below the wing to get the transverse alignment.
Then operate the forward hydraulic jack to get the longitudinal alignment.
When you have done the longitudinal alignment, do a check of the transverse alignment.

UGB13131 - U7ST0M0 - UM07D1000000002



LEVELING AND WEIGHING - WEIGHING & QUICK LEVELING PROCEDURE WITH THE ADIRU

JACKING (2)

LEVELING AND WEIGHING (continued)

QUICK LEVELING WITH A SPIRIT LEVEL IN THE FWD CARGO COMPARTMENT (ALTERNATE METHOD)

The quick leveling with a spirit level is an alternative method of leveling while the ADIRUs are not available (no power supplied to the aircraft) and no attitude monitors are installed. For this method two persons are necessary:
- one in the cargo compartment to move the spirit level,
- another one near the aircraft to operate the jacks.

While the aircraft is being lifted, put a spirit level on a track:
- in the Y axis, perpendicular to the tracks, and operate the hydraulic jack below the wing to get the transverse alignment,
- in the X axis, and operate the forward hydraulic jack to get the longitudinal alignment.

When you have done the longitudinal alignment, do a check of the transverse alignment.

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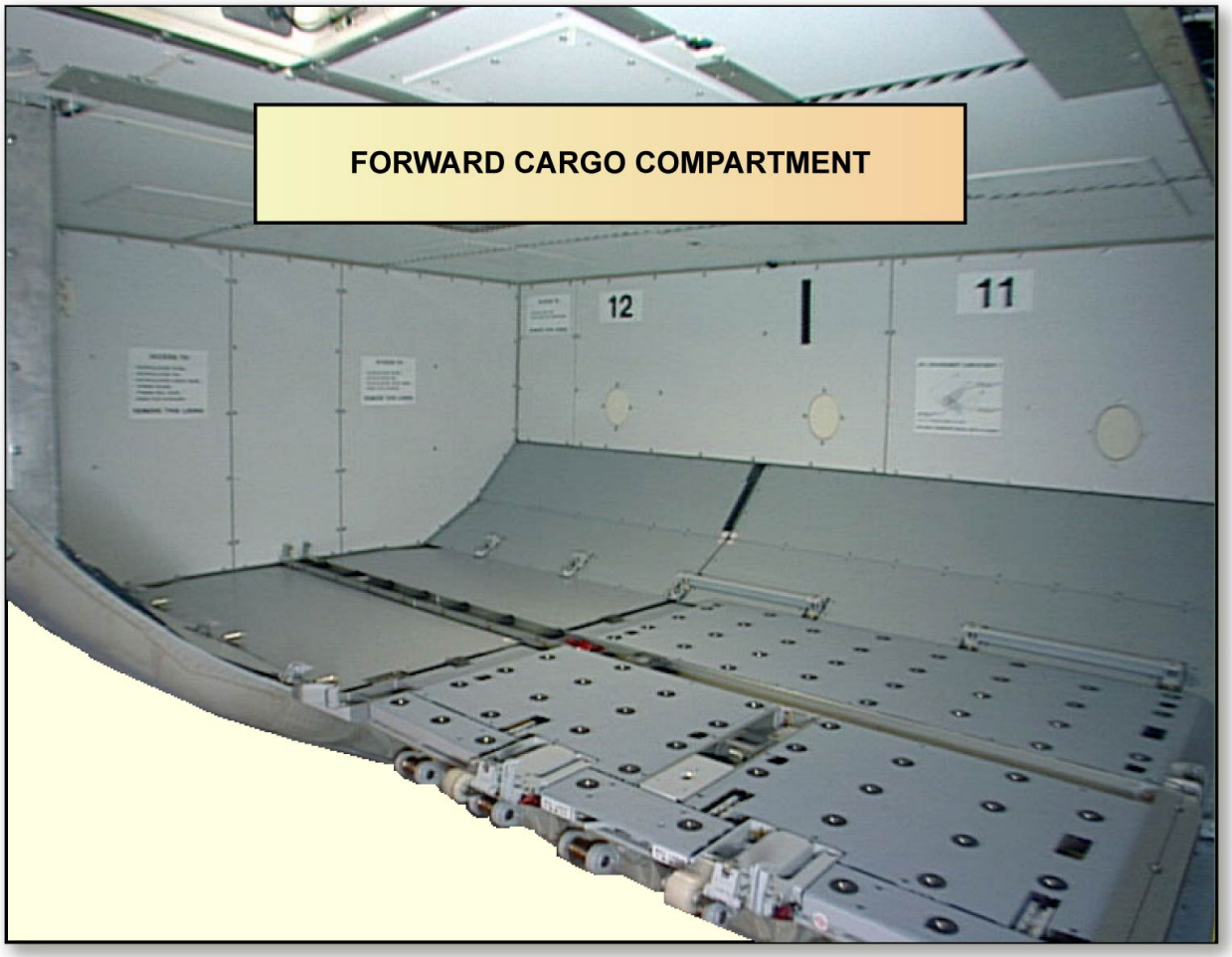

SPIRIT
LEVEL

LEVELING AND WEIGHING - QUICK LEVELING WITH A SPIRIT LEVEL IN THE FWD CARGO COMPARTMENT (ALTERNATE METHOD)

TOWING AND TAXIING (2)

TOWING

WARNINGS AND CAUTIONS

Obey the warning and cautions before, during and after to tow or pushback the A/C.

UGB13131 - U7ST0M0 - UM09D1000000001

WARNING

MAKE SURE THAT THE GROUND SAFETY-LOCKS ARE IN POSITION ON THE LANDING GEAR.

MAKE SURE THAT WHEN THE A/C MOVES WITH ITS POWER ON THE GROUND:
- NO PERSONS GO WHERE THE A/C CAN CAUSE THEM INJURY OR CAN KILL THEM.
- NO OBJECTS STAY WHERE THE ENGINES CAN BLOW THEM AWAY OR CAN PULL THEM INTO THE ENGINES BY SUCTION.

OBEY THESE SAFETY PRECAUTIONS DURING TOWING, PUSHBACK OR MOVEMENT OF THE A/C.
MAKE SURE THAT THE PATH OF THE A/C IS CLEAR.
MAKE SURE THAT NO PERSONS SIT OR STAND ON THE TOW BAR OR USE THE TRACTOR AS TRANSPORT THIS IS TO PREVENT THE RISK OF INJURY.

THE PERSON WHO OPERATES THE BRAKES FROM THE COCKPIT DURING TOWING/TAXIING MUST HAVE HIS SIT BELT ATTACHED. IF NOT THERE IS A RISK OF INJURY IF THE A/C STOPS SUDDENLY.

WHEN YOU COMPLETE THE TOWING OPERATION, MAKE SURE THAT THE NOSE WHEELS ARE ALIGNED WITH THE A/C CENTERLINE. THE TWIN WHEELS MAY COME BACK TO THE CENTERED POSITION.

CAUTION

SET AND CALIBRATE THE TOWING AND TURN SHEAR PINS BEFORE YOU TOW OR PUSH BACK THE A/C. THIS IS TO PREVENT HIGH LOADS WHICH CAN CAUSE DAMAGE TO THE NOSE LANDING GEAR AND/OR THE A/C STRUCTURE.

DO NOT TOW OR MOVE THE A/C ON THE GROUND IF THE ENGINES COWLS ARE OPEN.
MOVEMENT OF THE A/C WITH THE COWLS OPEN CAN CAUSE DAMAGE TO THE COWLS AND THE NACELLE STRUCTURE.

TOWING - WARNINGS AND CAUTIONS

UGB13131 - U7ST0M0 - UM09D1000000001

TOWING AND TAXIING (2)

TOWING (continued)

TOWING WITH THE NOSE GEAR FROM THE FRONT

This film describes how to push the A/C rearwards or tow the A/C forwards with the nose gear.
The A/C may be towed or pushed back:
- at maximum ramp weight,
- with the engines shut down or running at idle.

To begin the procedure, make sure:
- that the safety devices are installed on the landing gears (L/G),
- the wheel chocks are in place,
- and check if the parking brake is ON.

Do not tow the A/C if the dimension H is more than 300 mm (11.8 in). If you do, you can cause damage to the internal centering cams of the nose landing gear (NLG).
Referring to your A/C maintenance manual, make sure that the A/C is stable. Let us suppose that this procedure has been correctly done.
During this procedure, depending on the configuration you are in, the A/C needs to be energized either by using the APU, a specific ground cart, an engine running, or by using the tractor itself. Let us suppose that the A/C is already energized and the EIS start procedure done.
Outside, on the nose wheel steering deactivation electrical-box, set the ground-towing control lever to the towing position and install the pin.
In the cockpit,
- on the upper ECAM page, the "Nose.WHEEL STEERinG DISConnected" message comes into view on the memo page.
- check on the Yellow brake-pressure triple-indicator that the accumulator pressure pointer is in the green range.

We recommend pressurizing the yellow hydraulic system using the yellow electrical pump, thus, the braking system will be more efficient and safer. Now, we have to install the tow bar.

CAUTION: Caution: make sure that the tow bar has:
- a damping system
- a calibrated shear pin
- two calibrated turn shear pins.

This is to prevent high loads causing damage to the L/G.
Refer to your A/C maintenance manual for the calibration of these pins.
On the NLG, install the tow bar on the tow fitting and connect the tow bar to the tractor.

CAUTION: Caution: put the parking brake control switch in the off position before you tow or push back the A/C. This is to prevent high loads causing damage to the NLG.
On the Yellow brake-pressure triple-indicator, the brakes pressure pointers go down.
In the cockpit, set the lighting system:
- set the exterior light navigation and logo switch to ON.
- at night, set the interior light dome switch to bright and if the anti-collision lighting is necessary for the local airport regulations or the airline procedures, set the exterior light beacon switch to ON.

On the VHF system:
- in order to communicate with the control tower during towing operations, release out the VHF pushbutton switch and select the control tower frequency on the radio management panel.
- in order to communicate with the ground mechanics, on the audio control panel, set the interphone radio switch to the interphone position and release out the interphone reception pushbutton.

For safety reasons, a distance of 3 meters (10 ft) must be kept clear around the nose wheels, tow bar and tractor when the aircraft moves.
Towing speed limitation depends on the position of the passenger/crew and cargo doors. For these speed limitations refer to your A/C maintenance manual.

The maximum permitted steering angle on each side of the A/C centerline is 95 degrees. At this point, be sure that all warnings and cautions of your A/C maintenance manual procedure and previous precautions are applied. Now, the A/C can be towed slowly and smoothly. Two other persons have to monitor the wing tips during the towing operation and one person is required in the cockpit in order to operate the brakes.

When you complete the towing operation, make sure that the nose wheels are aligned with the A/C centerline.

Inform the cockpit to apply the parking brake, and check that the parking brake light is ON on the nose wheel steering deactivation electrical-box.

Put the wheel chocks in position.

Disconnect the tow bar from the nose gear fittings. On the nose wheel steering deactivation electrical-box, remove the safety pin and set the ground-towing control lever to the normal position. At the same time, in the cockpit, on the ECAM memo display the message "N.WHEEL STEERG DISC" disappears.

On the lighting system:

- reset the exterior light beacon and navigation & logo switches to OFF.
- reset the interior light dome switch to OFF.

On the communication system:

- cut the cockpit/control tower VHF link by pressing in the VHF pushbutton on the radio management panel.
- reset the interphone radio switch to the neutral position.

Depressurize the yellow hydraulic system, do the EIS stop procedure and de-energize the A/C electrical circuits.

TOWING - TOWING WITH THE NOSE GEAR FROM THE FRONT

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TOWING AND TAXIING (2)

TAXIING AND ASSOCIATED PRECAUTIONS

TURNING RADII

The movement of the aircraft with its power on the ground is called taxi of the aircraft. During taxi of the aircraft, the minimum turning radii must be respected.

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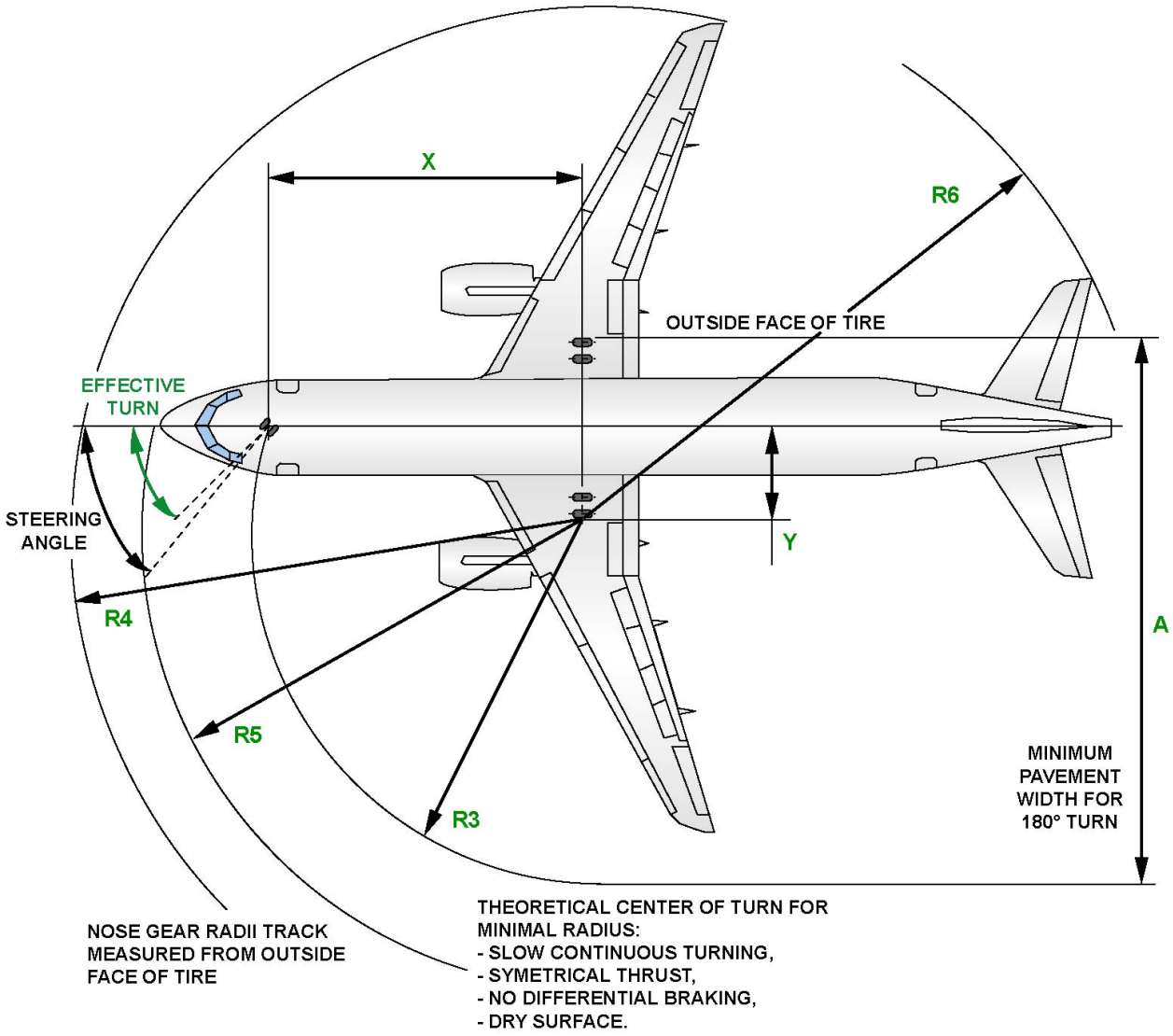

AT 75° STEERING ANGLE:

	A318	A319	A320	A321
EFFEC TURN	73.20°	70.03°	70°	73°
X	33.63 10.25	36.22 11.04	41.5 12.64	55.4 16.91
Y	10.1 3.1	13.2 4.01	15.1 4.6	16.6 5.1
A	61.2 18.7	67.7 20.64	75.1 22.9	90.5 27.6
R3	36.3 11.1	39.7 12.11	45.3 13.81	59.1 18
R4	67.6 20.6	70.8 21.58	72.2 21.99	74.3 22.7
R5	51.3 15.6	54.5 16.6	60 18.3	74 22.6
R6	58.8 17.9	64.9 19.77	71.9 21.91	80.3 24.5

FEETS
METERS

TAXIING AND ASSOCIATED PRECAUTIONS - TURNING RADII

TOWING AND TAXIING (2)

TAXIING AND ASSOCIATED PRECAUTIONS (continued)

DANGER AREAS

Safety precautions must be taken to avoid danger from engine suction and exhaust areas. Access to the engine is only allowed through the entry corridor. Note that the entry corridor must be closed for wind directions greater than 90º. There is no safe access corridor when the engine is running above minimum idle. Depending on the distance from the running engine and on its power setting, it is necessary to wear ear protection and to respect the maximum time exposure.

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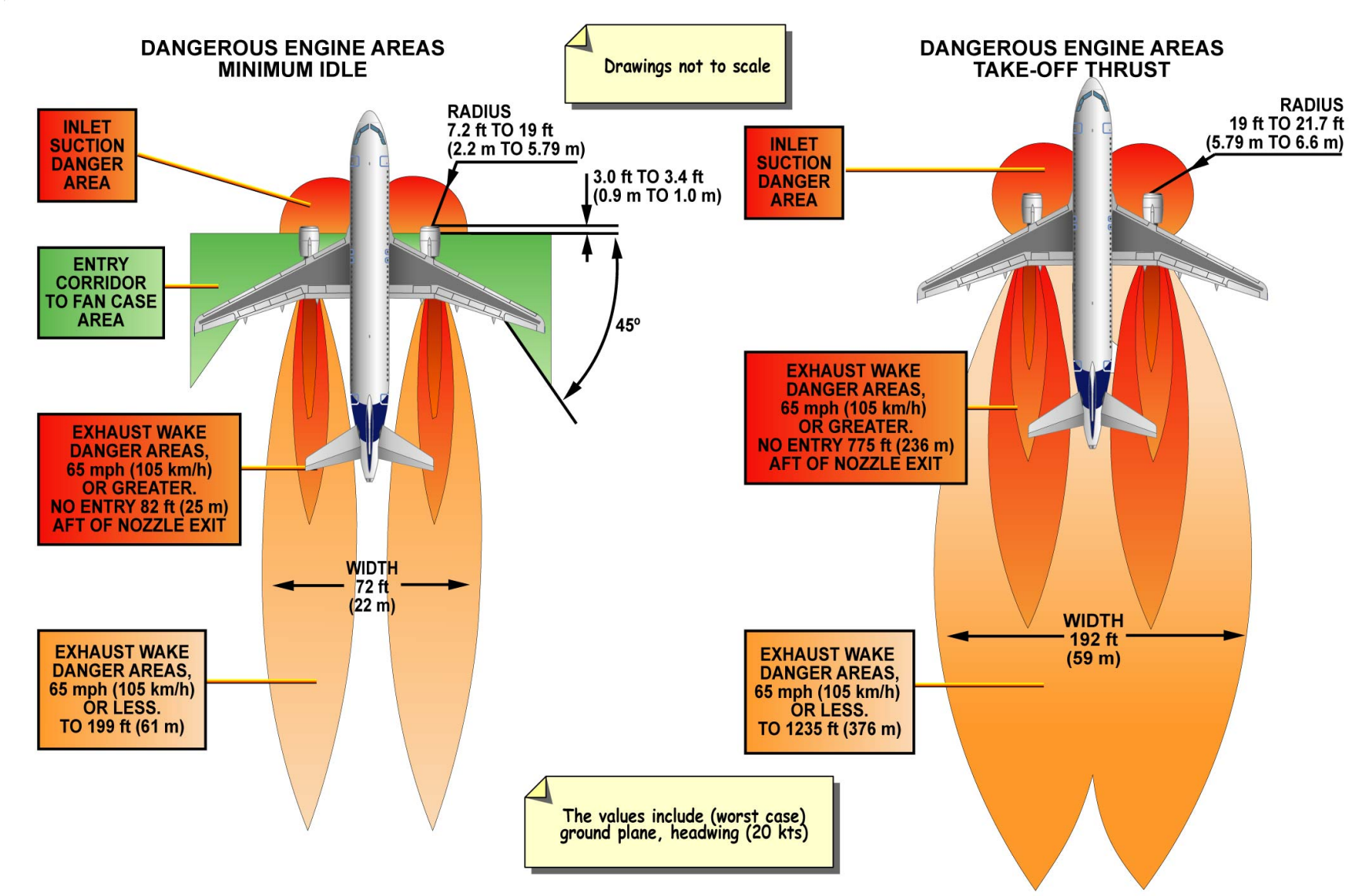
DANGEROUS ENGINE AREAS
MINIMUM IDLE
Drawings not to scale
DANGEROUS ENGINE AREAS
TAKE-OFF THRUST
INLET SUCTION DANGER AREA
RADIUS
7.2 ft TO 19 ft
(2.2 m TO 5.79 m)
3.0 ft TO 3.4 ft
(0.9 m TO 1.0 m)
ENTRY CORRIDOR TO FAN CASE AREA
45°
EXHAUST WAKE DANGER AREAS, 65 mph (105 km/h) OR GREATER. NO ENTRY 82 ft (25 m) AFT OF NOZZLE EXIT
WIDTH
72 ft
(22 m)
EXHAUST WAKE DANGER AREAS, 65 mph (105 km/h) OR LESS. TO 199 ft (61 m)
INLET SUCTION DANGER AREA
RADIUS
19 ft TO 21.7 ft
(5.79 m TO 6.6 m)
EXHAUST WAKE DANGER AREAS, 65 mph (105 km/h) OR GREATER. NO ENTRY 775 ft (236 m) AFT OF NOZZLE EXIT
WIDTH
192 ft
(59 m)
EXHAUST WAKE DANGER AREAS, 65 mph (105 km/h) OR LESS. TO 1235 ft (376 m)
The values include (worst case) ground plane, headwing (20 kts)

TAXIING AND ASSOCIATED PRECAUTIONS - DANGER AREAS

UGB13131 - U7ST0M0 - UM09D1000000001

WHEEL AND BRAKE REMOVAL & INSTALLATION (2)

mlg wheel and brake removal/installation

WARNING: Be careful when you remove/install the wheel and tire assembly to prevent injury to persons and/or damage to the wheel, axle or other equipment. The assembly is very heavy (between 130 Kg and 200 Kg (290 lb and 440 lb)).

WARNING: You must not put too much grease on the axle sleeve. A very hot brake can cause the grease to burn and cause a fire.

removal/installation

CAUTION: Make sure that the protected axle thread is correctly installed on the axle. You can cause damage to the axle sleeve when you remove/install a wheel if the axle thread protector is:
- not used,
- not fully engaged on the axle.

Preparation:
Outside:
- make sure that the L/G safety devices are in position,
- as well as the wheel chocks.

In the cockpit:
- open, safety and tag the Tire Pressure Indicating System (TPIS) and the brake fans C/Bs,
- put warning notices on the free fall control handle and on the L/G control lever,
- set the parking brake to OFF,
- make sure that the pressure is off and the brake fan P/B is set to off.

Outside again:
- put the jack in position,
- make sure that the dome correctly engages,
- lift the L/G.

Wheel removal:
- fully deflate the tire if it must be changed,
- remove the guard assembly attached by means of 6 screws,
- remove the lock wire,
- insert a tool to lock the impeller and unscrew the nut,
- remove the impeller,
- remove the shroud fixed by 2 screws,
- disconnect the TPIS sensor connector from the rotating transformer,

NOTE: Note that the TPIS sensor must be removed from the wheel if it is changed,

- remove the "V" clamp and the shroud support,
- discard the cotterpins, loosen and remove the 2 locking bolts,
- loosen the wheel nut using the torque adaptor and remove it,
- install the properly greased protection tool,
- using a specific tool, remove the wheel.

Brake removal:
- disconnect the self-sealing couplings,
- disconnect the brake temperature sensor,
- using an adaptor, loosen and remove the three nuts and washers,
- the protective tool being installed on the axle, remove the wheel.

Brake installation:
- remove the protective tool, clean and grease the axle,
- the protective tool being fitted, install the brake unit,
- make sure that the studs engage correctly on the axle,
- install the 3 washers and nuts,
- adjust the torque meter value and torque the 3 nuts,
- connect the brake temperature sensor,
- reconnect the self-sealing couplings,
- remove the protection devices.

Wheel installation:
- make sure that the driving keys on the brake rotor are correctly aligned,

UGB13131 - U7ST0M0 - UM32Y3000000001

- the axle protective tool being fitted, install the wheel with the tool,
- remove the protection device,
- install the axle nut,
- adjust the torque meter to the pre-torque value and apply it to the nut while turning the wheel,
- prevent the rotation of the wheel and loosen the nut,
- adjust the torque meter to the torque value,
- torque the axle nut,
- tighten it until the holes in the nut are aligned with the holes in the axle,
- install the locking nuts with the head of the screws facing the axle,
- fit the washers and the nuts,
- tighten the nut,
- safety the locking nuts with split pins,
- install the shroud support centered by a centering pin and tighten the "V" clamp,
- reconnect the TPIS sensor plug,
- install the shroud with the 2 srews,
- align the splined driving shaft with the impeller,
- install the impeller, prevent its rotation and tighten the nut,
- safety the nut with lockwire,
- install the guard on the tachometer drive shaft and fit it with the 4 screws.

Close-up:
- make sure that the area is clean. Lower the L/G, the tire pressure being previously checked and adjusted,
- carefully remove the jack from the L/G dome.

In the cockpit:
- remove the tags and close the circuit breakers,
- select the ECAM HYDraulic page,
- pressurize the green hydraulic system,
- press the braking pedals.

Outside:
- check the forward coupling for any leakage.

In the cockpit:
- apply the parking brake and check the pressure on the triple gage indicator.

Outside:
- check the rear coupling for any leakage.

In the cockpit:
- depressurize the hydraulic systems,
- select the ECAM WHEEL page,
- check the brake temperature and tire pressure for correct indication,
- select the brake fans ON.

Outside:
- check the brake fans for correct operation.

In the cockpit:
- select the brake fans off and remove the warning notices.

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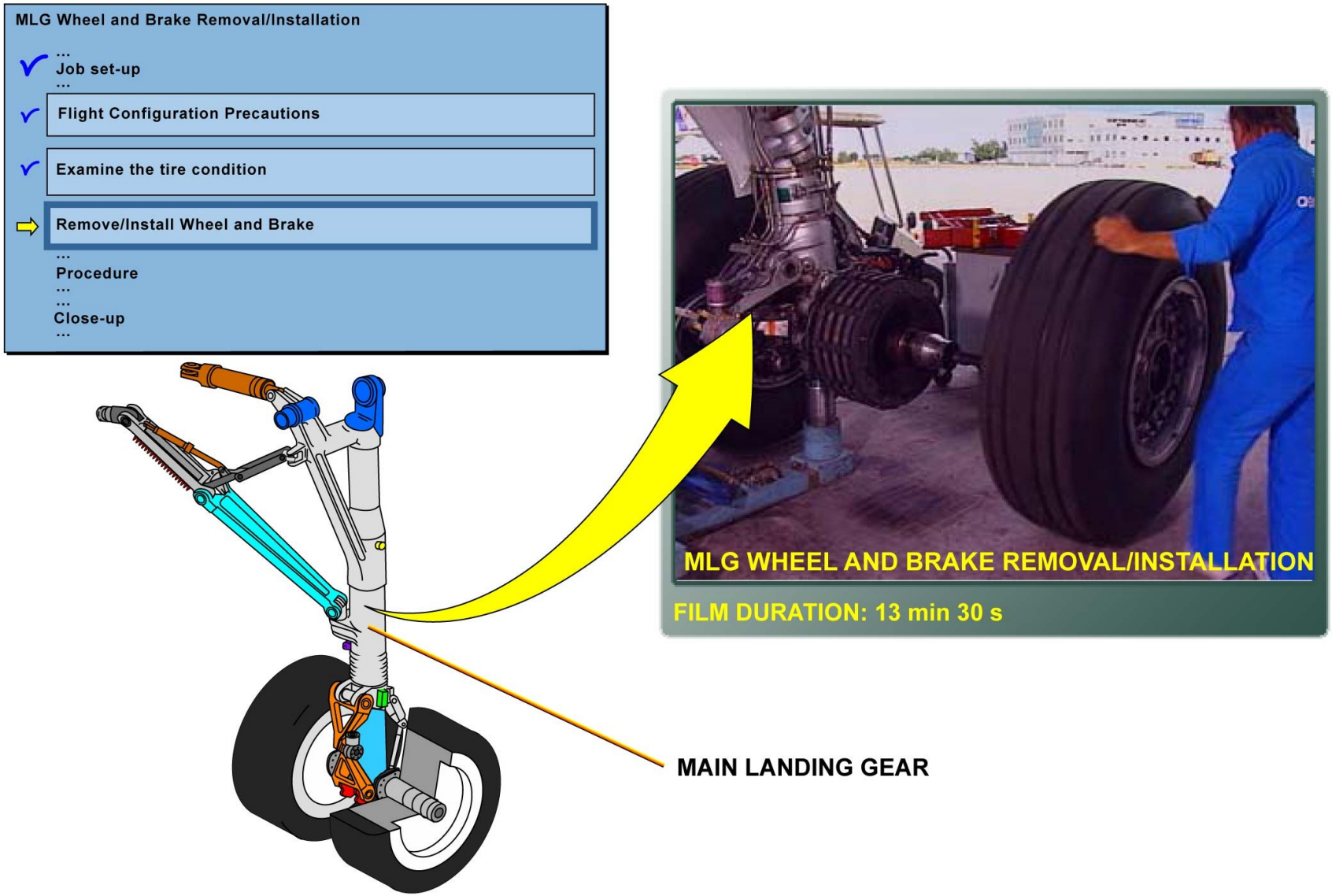

MLG WHEEL AND BRAKE REMOVAL/INSTALLATION - REMOVAL/INSTALLATION

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WHEEL AND BRAKE REMOVAL & INSTALLATION (2)

nlg wheel removal/installation

WARNING: Make sure that the ground safety-locks are in position on the L/G.

removal/installation

Preparation:
Outside:
- make sure that the safety locks and wheel chocks are in position on the L/G.

In the cockpit:
- open, safety and tag the TPIS C/B,
- put warning notices on the free fall and L/G control handles,
- select the parking brake OFF.

Outside again:
- put the jack in position,
- make sure that the dome correctly engages,
- lift the L/G,
- fully deflate the tire.

Wheel removal:
- cut and remove the lockwire,
- remove the 3 screws and washers and remove the hubcap,
- remove the grommet and disconnect the TPIS sensor plug from the rotating transducer.

NOTE: Note that the sensor has to be removed from the wheel and refitted on the new wheel.

- remove and discard the cotterpins,
- remove the 2 locking nuts,
- remove the axle nut with the torque adaptor,
- install the properly greased protection tool,
- remove the wheel,
- attach a correctly filled-in label on it.

Wheel installation:
- install the protection tool if removed,
- correctly grease the axle,
- install the wheel,
- remove the protection tool,
- install the nut,
- adjust the torque meter to the pre-torque value and apply it to the nut while turning the wheel,
- prevent the wheel from rotating and loosen the nut,
- adjust the torque meter to the correct value,
- torque the nut,
- tighten until the locking bolt holes are aligned,
- install the locking bolt with the head of the screw facing the axle,
- fit the washers and nuts,
- safety the locking nuts with split pins,
- connect the TPIS sensor to the rotating transducer,
- re-install the grommet,
- put the hubcap in position,
- install the 3 washers and screws,
- safety the 3 screws with lockwire.

Close-up
Outside:
- make sure that the working area is clean,
- lower the gear, the tire pressure being previously checked and adjusted,
- carefully remove the jack from the dome,
- put the chocks back in position.

In the cockpit:
- remove the tag and close the TPIS C/B,
- remove the safety warnings,
- select the ECAM WHEEL page,
- check the pressure for correct indication.

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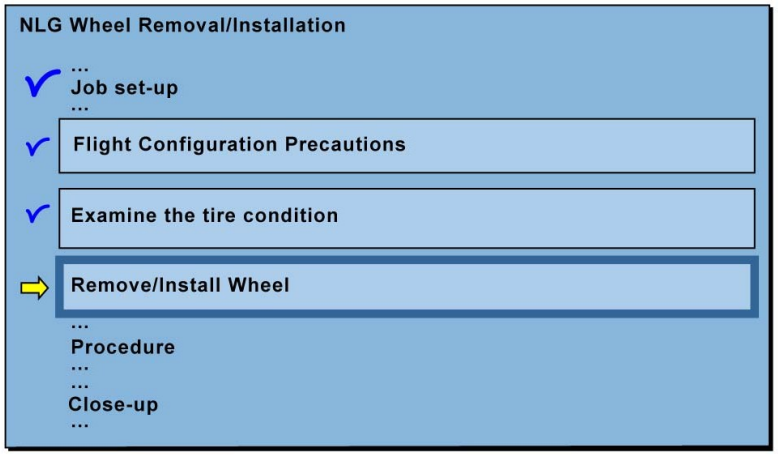

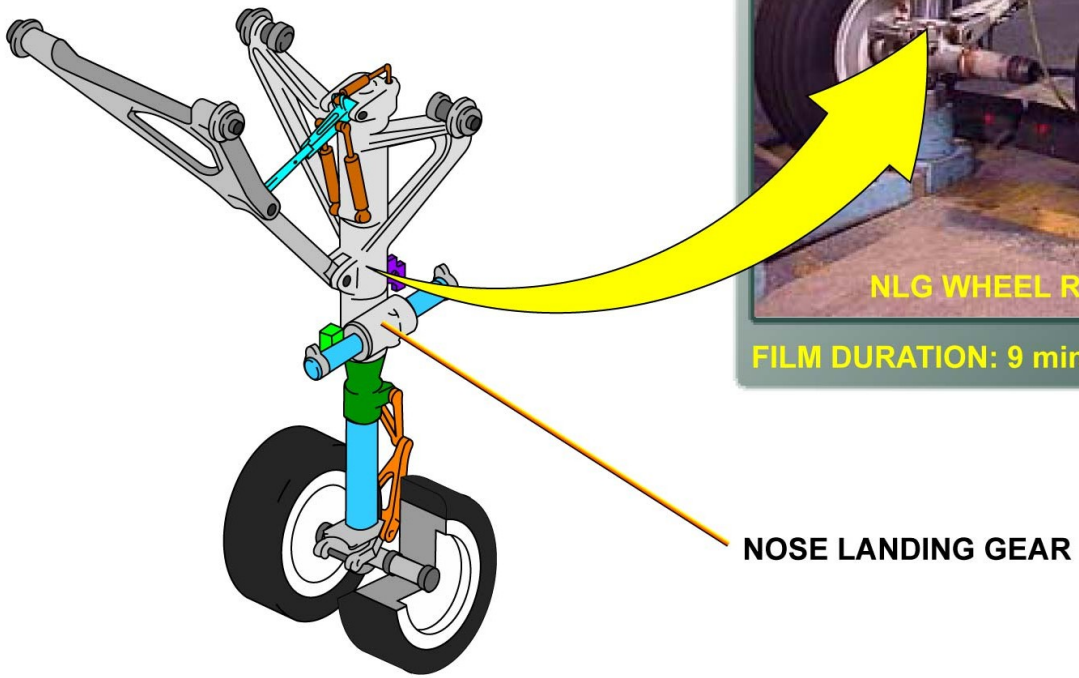

NLG WHEEL REMOVAL/INSTALLATION - REMOVAL/INSTALLATION

MAIN LANDING GEAR SHOCK ABSORBER SERVICING (3)

GENERAL

WARNING: PUT THE SAFETY DEVICES AND THE WARNING NOTICES IN POSITION BEFORE YOU START A TASK ON OR NEAR:
- THE FLIGHT CONTROLS,
- THE FLIGHT CONTROL SURFACES,
- THE L/G AND THE RELATED DOORS,
- COMPONENTS THAT MOVE.

MAKE SURE THAT THE GROUND SAFETY-LOCKS ARE IN POSITION ON THE L/G.
DO NOT PUT COMPRESSED GAS IN CONTACT WITH YOUR SKIN. THE GAS CAN GO THROUGH THE SKIN AND MAKE BUBBLES IN THE BLOOD. THIS CONDITION CAN KILL YOU.
IF YOU GET THE FLUID ON OR IN YOUR EYES:
- FLUSH IT AWAY WITH CLEAN WATER,
- GET MEDICAL AID.

PA is the pressure measured at the top charging valve (valve A). PB is the pressure measured at the bottom charging valve (valve B). H is the height of the shock absorber measured as shown below.

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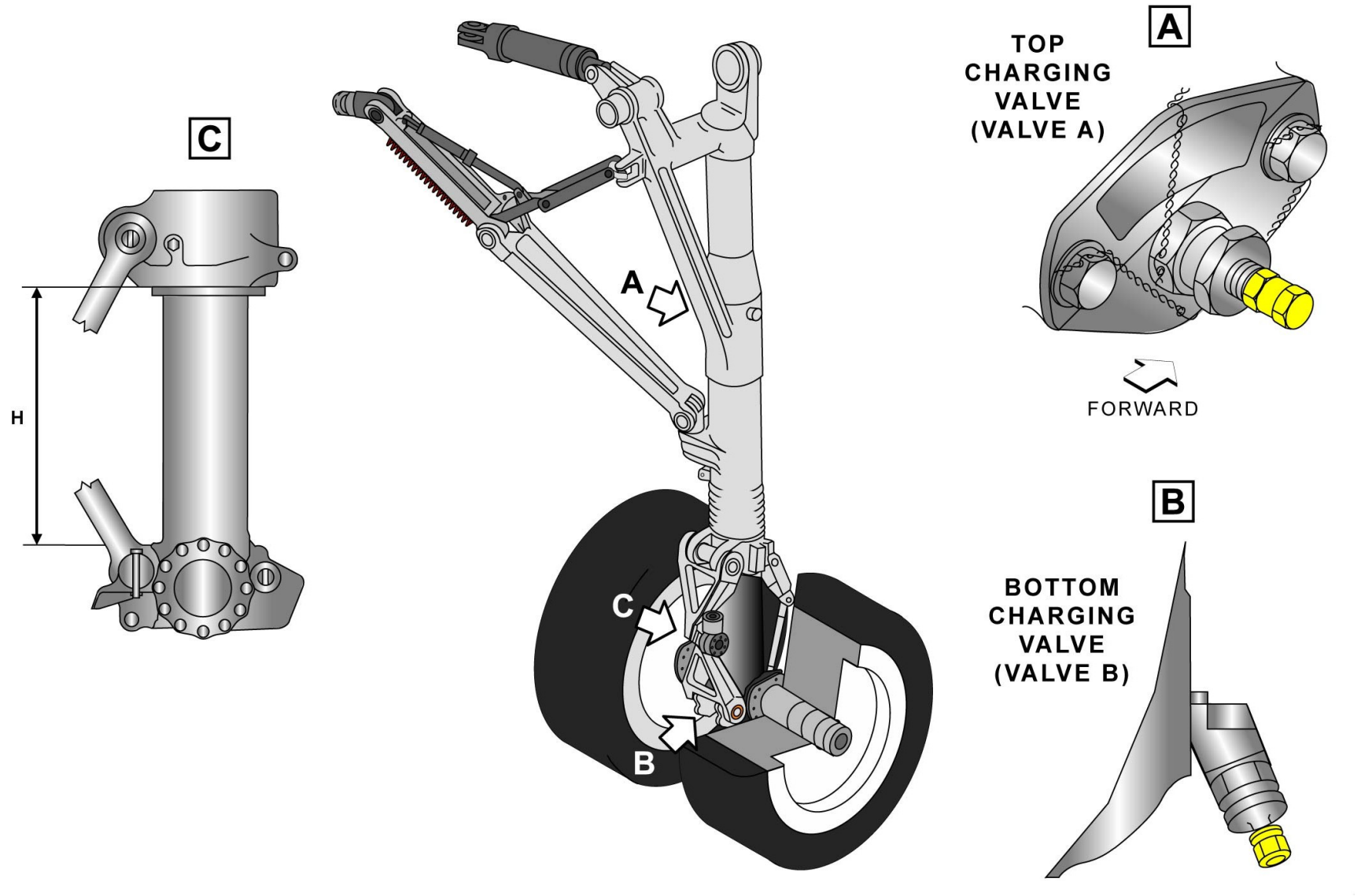
C
H
A
C
B
A
TOP
CHARGING
VALVE
(VALVE A)
FORWARD
B
BOTTOM
CHARGING
VALVE
(VALVE B)

GENERAL

MAIN LANDING GEAR SHOCK ABSORBER SERVICING (3)

SERVICING PROCEDURES

Before filling, it is necessary to perform a visual inspection of the MLG two-stage shock absorber for leakage of hydraulic fluid and to detect any damage on the sliding tube.

INSPECTION OF THE MLG SHOCK ABSORBER BEFORE FLIGHT

Check charge and nitrogen filling of the MLG two-stage shock absorber.

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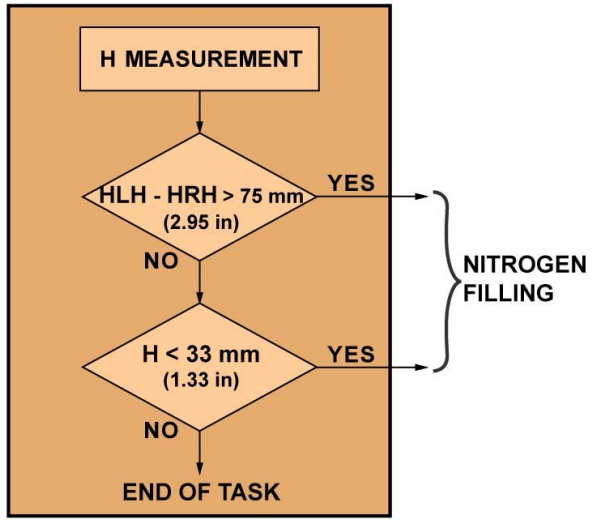


INSPECTION OF THE MLG SHOCK ABSORBER BEFORE FLIGHT

Case shown in the film

Other cases not covered in the film

HLH : Dimension H measured on the left hand shock absorber

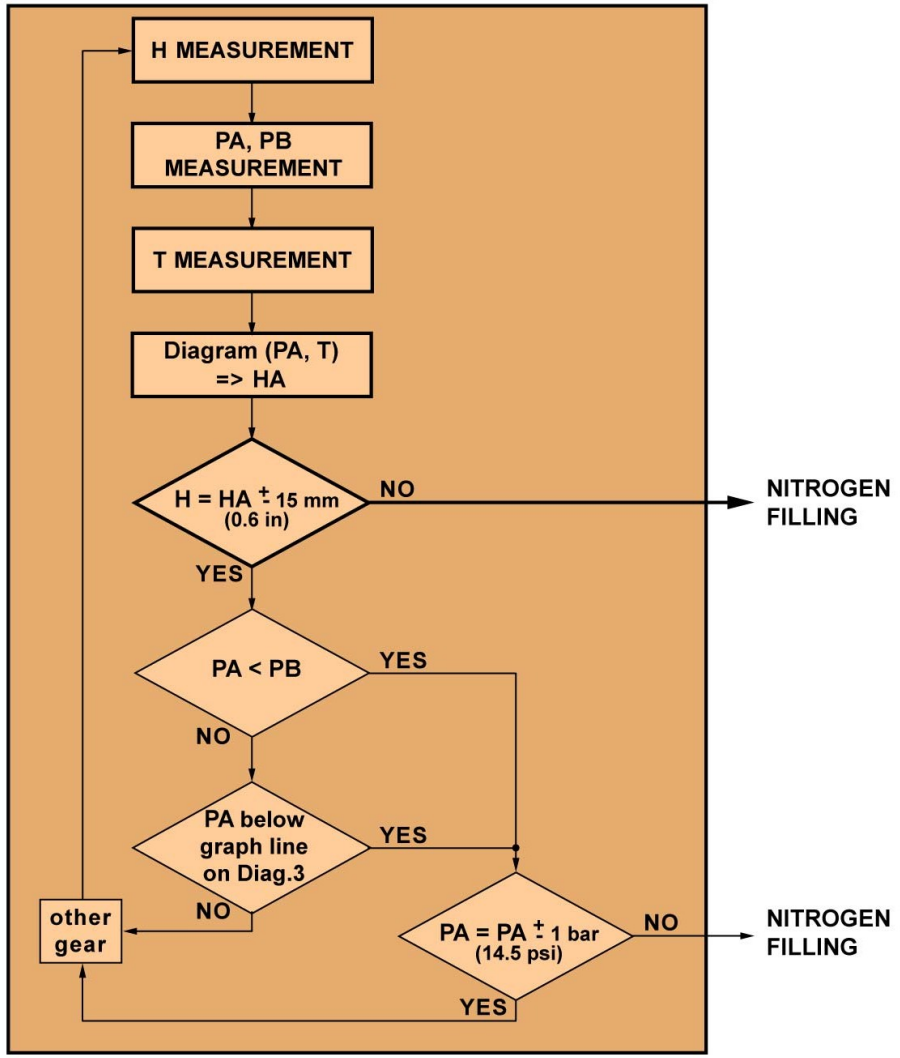
HRH : Dimension H measured on the right hand shock absorber

PA : Pressure measured at the top charging valve (valve A)

PB : Pressure measured at the bottom charging valve (valve B)

HA : Dimension H found in diagram 1 or 2 corresponding to the pressure measured at the top charging valve (valve A) and the measured temperature

T : Temperature



CHECK CHARGE AND NITROGEN FILLING OF THE MLG TWO-STAGE SHOCK ABSORBER

SERVICING PROCEDURES - INSPECTION OF THE MLG SHOCK ABSORBER BEFORE FLIGHT

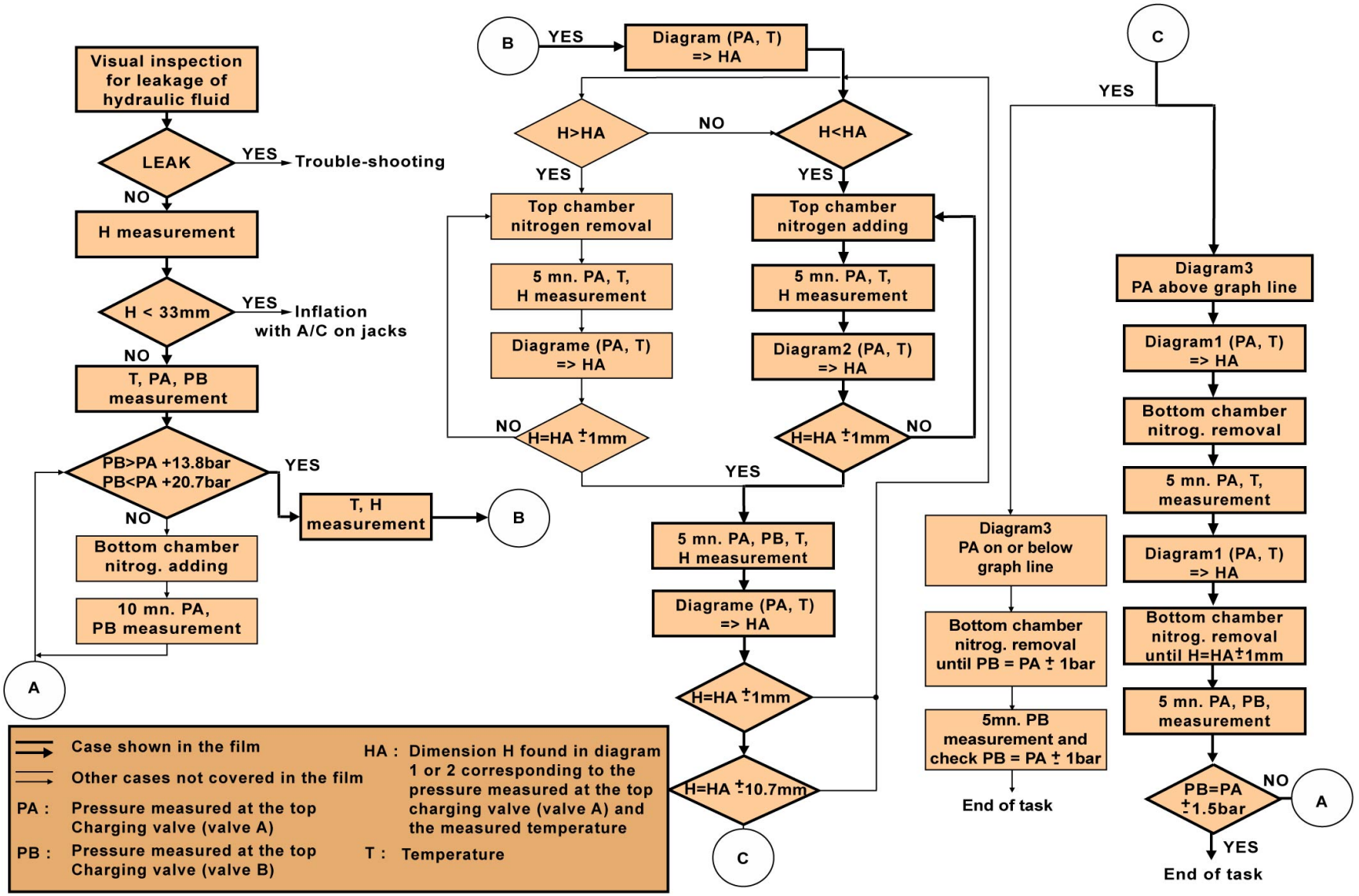
MAIN LANDING GEAR SHOCK ABSORBER SERVICING (3)

SERVICING PROCEDURES (continued)

NITROGEN FILLING OF THE MLG TWO-STAGE SHOCK ABSORBER (METRIC UNITS)

Nitrogen filling of the MLG two-stage shock absorber.

UGB13131 - U7ST0M0 - UM32Y2000000001



SERVICING PROCEDURES - NITROGEN FILLING OF THE MLG TWO-STAGE SHOCK ABSORBER (METRIC UNITS)

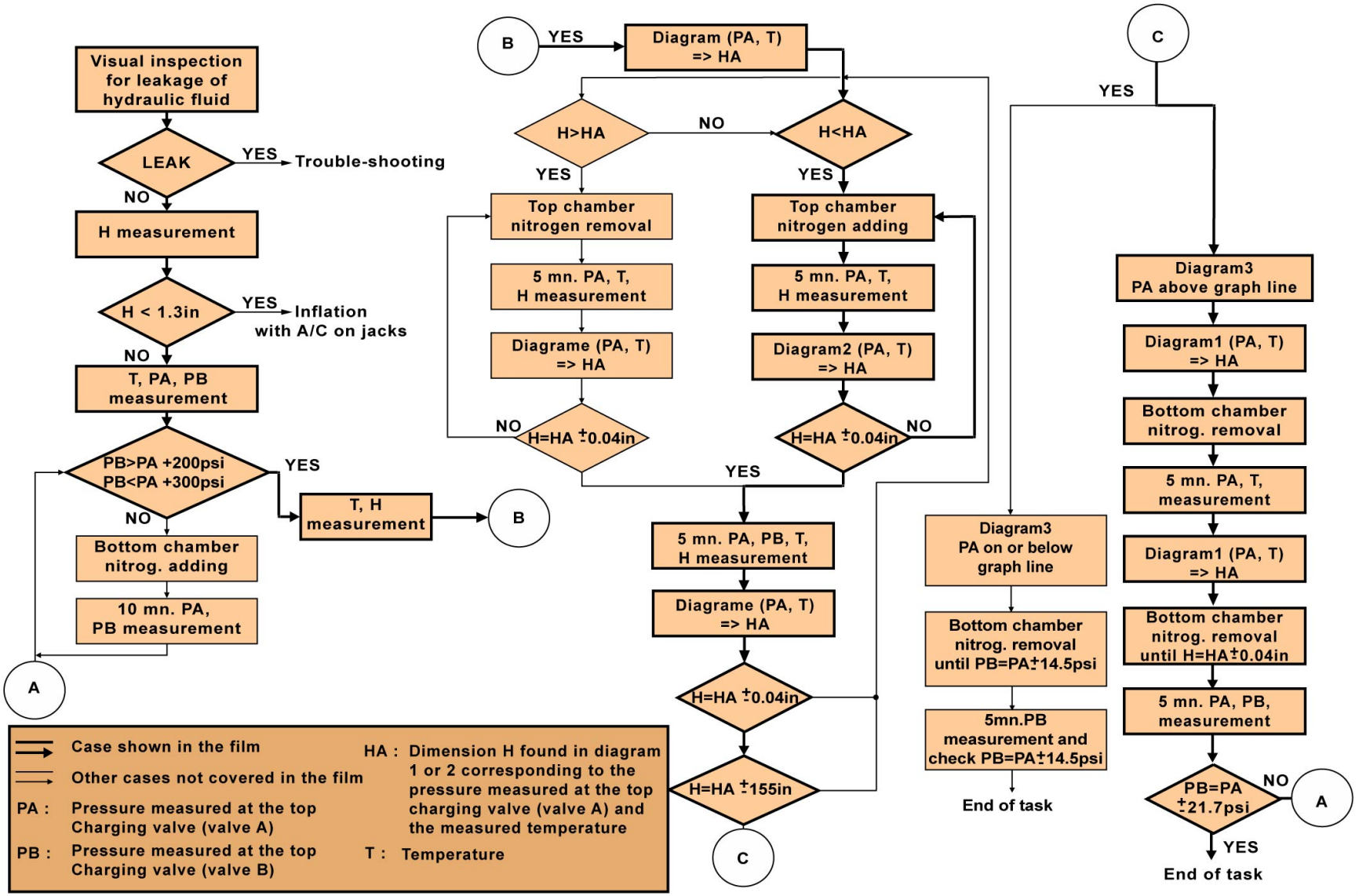
MAIN LANDING GEAR SHOCK ABSORBER SERVICING (3)

SERVICING PROCEDURES (continued)

NITROGEN FILLING OF THE MLG TWO-STAGE SHOCK ABSORBER (US UNITS)

Nitrogen filling of the MLG two-stage shock absorber.

UGB13131 - U7ST0M0 - UM32Y2000000001



SERVICING PROCEDURES - NITROGEN FILLING OF THE MLG TWO-STAGE SHOCK ABSORBER (US UNITS)

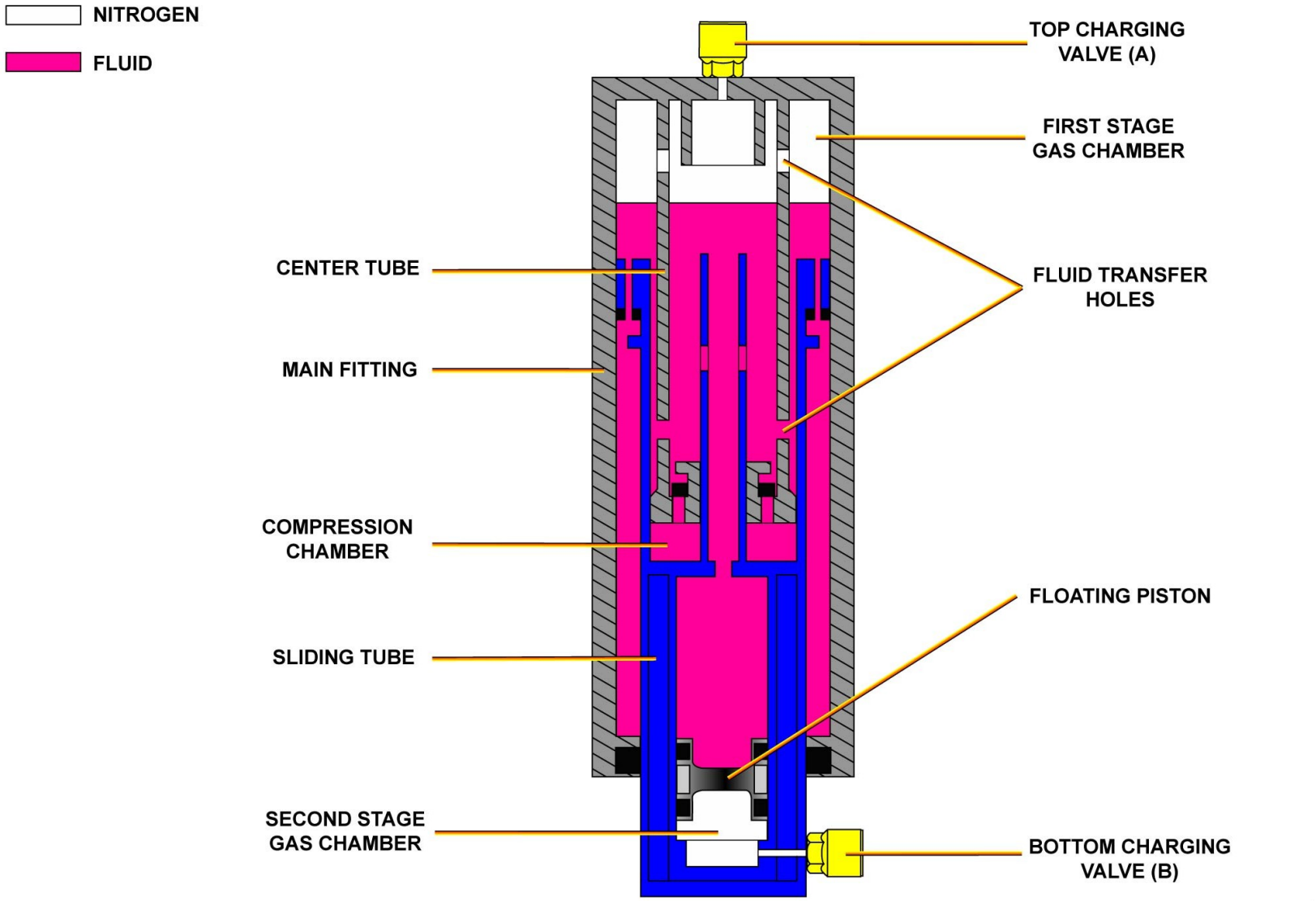
UGB13131 - U7ST0M0 - UM32Y2000000001

MAIN LANDING GEAR SHOCK ABSORBER SERVICING (3)

MLG CONDITION CHECK PROCEDURE

Before you start to work on the landing gear, make sure you have installed the safety sleeve on the lock-stay actuator and that you have placed wheel chocks in position.
In the cockpit make sure the Landing Gear Control lever is in the down position.
Place a warning notice to prevent others from operating the control lever.
NOTE: The shock absorber must be examined for any leak or damage
Measure the dimension "H" of the sliding tube extension and measure the temperature of the shock-absorber at the top charging valve.
Compare the values with the placard on the shock-absorber.
If the result does not match the measured values, you should adjust the nitrogen pressure.
Unscrew the cap and connect the pressure gauge hose to the top-charging valve and open the valve in order to read the pressure at "A". Adjust the pressure according to the temperature value given in the graph of the service placard. Close the valve and release the pressure from the hose.
Use a second pressure gage to check the pressure at the bottom charging valve at "B". Unscrew the cap and connect the pressure gage hose to the bottom charging valve "B". Open the valve and read the pressure. Make sure the pressure is 18 bar or 262 PSI higher than at the top charging valve "A". Adjust the pressure if required. Close the bottom charging valve and release the pressure from the hose. Disconnect the hose and reinstall the protective cap.
Open the top charging valve to adjust the pressure and the final extension height to its correct value. Close the charging valve and release the pressure from the hose. Disconnect the hose and reinstall the protective cap again.
Make sure that at the end of the procedure the pressure at valve "B" and "A" are the same +/- 1,5 bar or 21,76 psi.
Finally measure the dimension "H" of the sliding tube again, to confirm the correct extension height and pressure adjustment.
NOTE: Frequent nitrogen filling of the MLG shock absorber can be an indication of low oil level. Record all nitrogen servicing work in the aircraft log. This will let you monitor if the fluid level check Procedure is necessary.
If the shock absorber has been fully deflated and inflated again, it is recommended that you - do a check of the MLG shock absorber charging pressure between four and seven days after the first subsequent flight.

MLG CONDITION CHECK PROCEDURE



MLG CONDITION CHECK PROCEDURE

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MAIN LANDING GEAR SHOCK ABSORBER SERVICING (3)

PRESSURE/EXTENSION GRAPH-VALUES OF THE FILM

Find below the points noticed during the film in their chronological order.
DIAGRAM 1:
(1) PA = 79 bar (1150 psi), T = 10ºC (50ºF)
HA = 141 mm (5.6 in)
(4) PA = 92 bar (1330 psi), T = 11ºC (52ºF
HA = 119 mm (4.7 in)
(5) PA = 86 bar (1250 psi), T = 11ºC (52ºF)
HA = 125 mm (4.9 in).
DIAGRAM 2:
(2) PA = 92 bar (1330 psi), T = 11ºC (52ºF)
HA = 140 mm (5.5 in).
DIAGRAM 3:
(3) PA = 92 bar (1330 psi).

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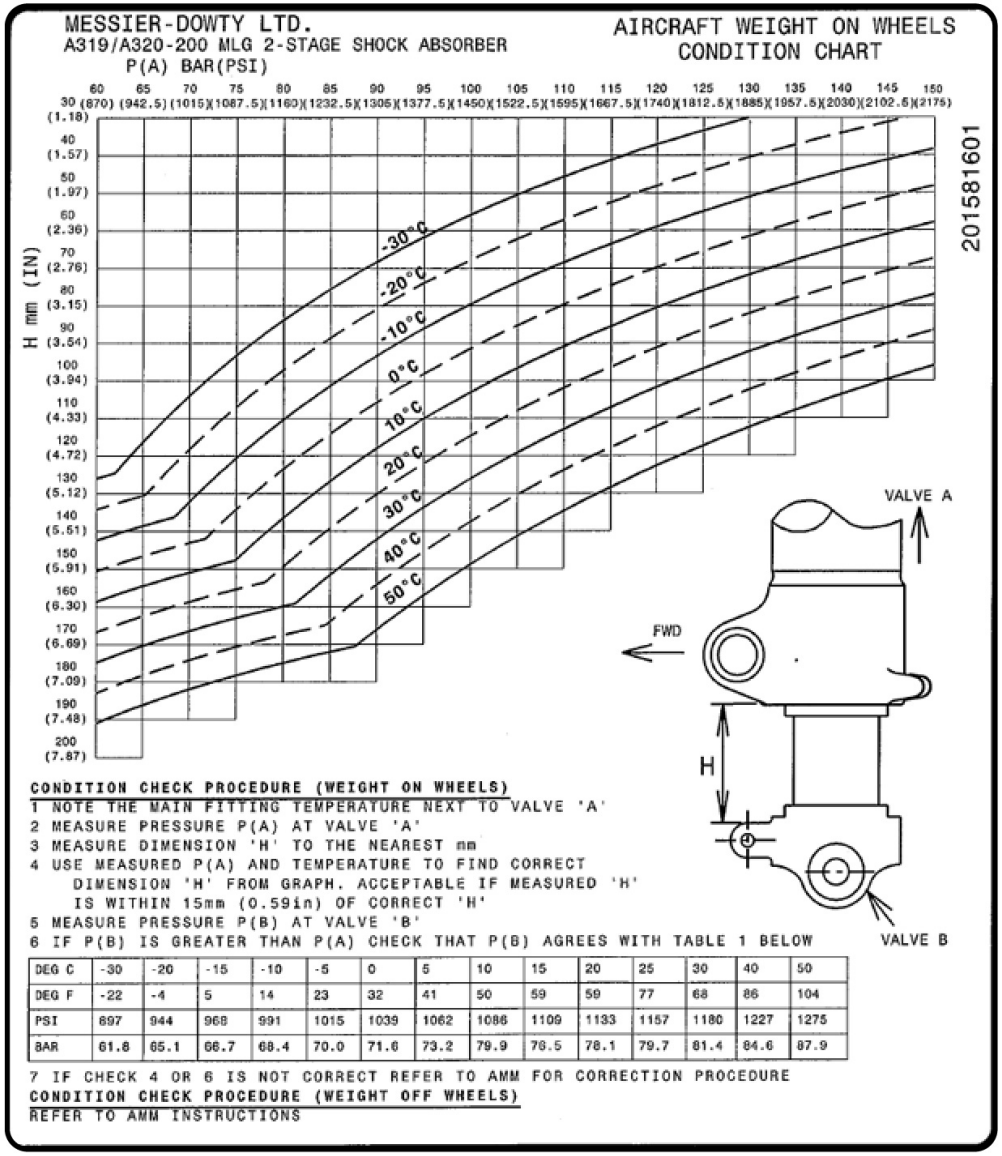
MESSIER-DOWTY LTD.
A319/A320-200 MLG 2-STAGE SHOCK ABSORBER
P(A) BAR(PSI)
AIRCRAFT WEIGHT ON WHEELS
CONDITION CHART
201581601
H mm (IN)
-30°C
-20°C
-10°C
0°C
10°C
20°C
30°C
40°C
50°C
VALVE A
FWD
H
VALVE B
CONDITION CHECK PROCEDURE (WEIGHT ON WHEELS)
1 NOTE THE MAIN FITTING TEMPERATURE NEXT TO VALVE 'A'
2 MEASURE PRESSURE P(A) AT VALVE 'A'
3 MEASURE DIMENSION 'H' TO THE NEAREST mm
4 USE MEASURED P(A) AND TEMPERATURE TO FIND CORRECT
DIMENSION 'H' FROM GRAPH. ACCEPTABLE IF MEASURED 'H'
IS WITHIN 15mm (0.59in) OF CORRECT 'H'
5 MEASURE PRESSURE P(B) AT VALVE 'B'
6 IF P(B) IS GREATER THAN P(A) CHECK THAT P(B) AGREES WITH TABLE 1 BELOW
7 IF CHECK 4 OR 6 IS NOT CORRECT REFER TO AMM FOR CORRECTION PROCEDURE
CONDITION CHECK PROCEDURE (WEIGHT OFF WHEELS)
REFER TO AMM INSTRUCTIONS

DEG C	-30	-20	-15	-10	-5	0	5	10	15	20	25	30	40	50
DEG F	-22	-4	5	14	23	32	41	50	59	59	77	68	86	104
PSI	897	944	968	991	1015	1039	1062	1086	1109	1133	1157	1180	1227	1275
BAR	61.8	65.1	66.7	68.4	70.0	71.6	73.2	79.9	76.5	78.1	79.7	81.4	84.6	87.9

PRESSURE/EXTENSION GRAPH-VALUES OF THE FILM

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STM
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